THE AMERICAN GAS LIGHT JOURNAL

INC.

PUBLISHED WEEKLY, AT No. 42 PINE STREET.

VOLUME CI., No. 16.
Whole No. 2,054.

NEW YORK, MONDAY, OCTOBER 19, 1914.

Subscription, $3 Per Year.
$4 Canada, $5 Foreign.

INDEX TO CONTENTS, PAGE 241 - - - - - - ADVERTISERS' INDEX, PAGE 18.

LIBRARY OF CONGRESS
OCT 19 1914
SMITHSONIAN DEPOSIT

Riter-Conley Manufacturing Company

STEEL CONSTRUCTION

Pittsburgh

191a,
6 prev

THE UNITED GAS IMPROVEMENT COMPANY,

PHILADELPHIA.

—•—

BUILDERS OF

THE STANDARD DOUBLE SUPERHEATER

LOWE WATER GAS APPARATUS.

—•—

ACCURATE MEASUREMENT

OF

AIR AND STEAM SUPPLY

(PATENTED),

AFFORDING { **PERFECT CONTROL OF GENERATOR FIRE CONDITIONS.**

PRODUCING { **UNIFORM RESULTS. HIGHEST EFFICIENCIES.**

THE AMERICAN
GAS LIGHT JOURNAL

VOL. CI., No. 16. NEW YORK, OCTOBER 19, 1914. WHOLE No. 2,054.

LIBRARY OF CONGRESS
OCT 19 1914

CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

*Gas Fired Steam Boilers, by H. E. G. Watson..... 241
*Liquid Gas, by Nisbet Latta—[Concluded from Page 227]..... 244
OFFICIAL NOTICE—
New Jersey State Gas Association... 248
EDITORIALS—
Briefly Told 248
American Gas Institute Convention—Illuminating Engineering Society—Power to Fix Rates—Hard on Utilities—The Economic Injustice of Municipally Owned Plants—The D. R. Russell Engineering and Development Company—The Third and Twenty-first President of the Pacific Coast Gas Association.
"Standard Methods of Gas Testing," by C. W. Hinman..... 250
*A New Standard Light Source, by L. A. Jones 251
Gas Style Show..... 253
NEW METHODS AND APPLIANCES..... 254
The Altior Process of Die-Casting.
ITEMS OF INTEREST FROM VARIOUS LOCALITIES 254
Lights Out—A Wag's Way—Municipal Plant Results—Dover, N, J. Minimum—Duluth, Minn., Reductions—Exempt from Motor Tax—A Personal—Meter Breaking—A Pennsylvania Charter—Baltimore, Md., Officers—To Use the Police—Cuero, Tex., Wants Plant—New Bedford, Mass., Office Building—President Scranton Better—Muscatine, Ia., Plant Ready—President McIlvain Still—Mr. Gribbel and Mr. Collins in Florida—And Other Items.
UTILITIES COMMISSION NEWS 256
Maryland Commission's Questions—Illinois Calorific Standards—Long Island Extensions.
Financial Notes..... 256
Public Lighting Table for October, 1914.....(Advertising Section) 10
Meeting Times of the Various Gas Associations " 23

Gas Fired Steam Boilers.[1]

[Prepared by H. E. G. WATSON, for Meeting, Canadian Gas Association.]

It is generally acknowledged that the chief factor in the tremendous industrial development of the last century was the introduction of the steam engine as a source of power. To the small manufacturer however, the power problem is still a matter of vexation, worry and excessive expense.

Naturally, therefore, with the perfection of electric motors and small gas engines hundreds of manufacturers have rid themselves of the troublesome steam installation. Many more would gladly do so were it not for the fact that small quantities of steam are required for various manufacturing operations.

Here is an opportunity for gas companies, and the industry has taken advantage of it to a certain extent, but only a fraction of the possible business has been secured in some cities. The business is certainly desirable, being an off-peak load, seldom requiring additional service to be laid, and averaging a steady monthly consumption of about 10,000 cubic feet per horse power of boiler installed. After a satisfactory installation has been made, little trouble is to be expected. Our company has been installing boilers for several years and we have yet to receive a complaint about the amount of the gas bill. Progressive manufacturers supply well-built economical boilers, and although their rather high cost has retarded their introduction, they are now rapidly approaching the prices of coal-fired boilers of equal capacities. There would seem then, little reason why any gas company should hesitate in placing as many as possible. A little judicious advertising, and a canvass by an intelligent salesman, will start the ball rolling; after that, proper installations and careful following up of prospective customers will do the rest.

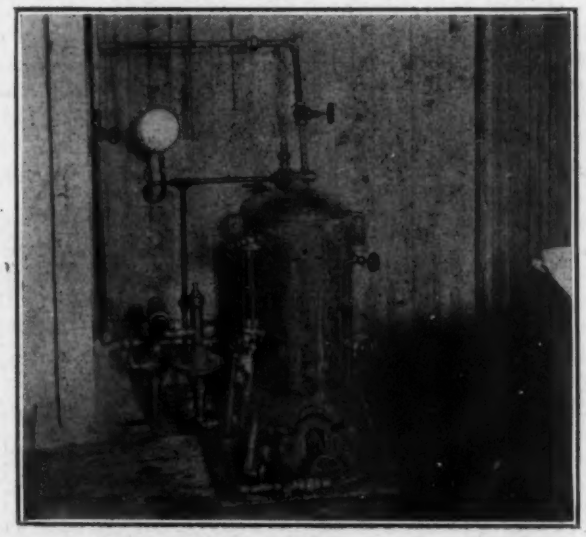


Fig. 1.—1-Horse Power Cast Iron Boiler Supplying Steam to Shoe Machines.

The selection of a salesman to look after this work is of importance. No matter how much he knows about gas, he is of little use unless he has a knowledge of steam. Very few users know how much steam they require, or the importance of making an installation which will operate economically. A customer usually considers he has done his whole duty when he states the pressure he requires. It is up to the salesman then, to decide what size and type of boiler is required and how to to install it.

In figuring on an installation, the safety of the boiler should receive first consideration, then simplicity, and finally, the striking of a nice balance between economy of operation and first cost. This last must be carefully considered, bearing in mind the purpose for which the boiler is wanted. For example, a man needing a boiler for sterilizing milk cans, which is used perhaps less than an hour a day, would want the lowest priced boiler he could buy to do his work. A hat manufacturer using steam 8 or 10 hours a day, could afford to spend considerable money to secure economy in fuel and labor. If the salesman is to permanently secure the business, he must decide these points, taking care of the best interests of the customer. Probably the most difficult thing is to select a boiler of the proper size. One too large may spoil the sale by making the price prohibitive; if one too small is selected everybody concerned will wish the sale had never been made. Gas-fired boilers, like coal-fired ones, are commonly rated in horse power. Occasionally it is to be feared they are over rated. One-horse power is the evaporation of 34.5 pounds of water from and at 212° F., in round figures equivalent to 33,000 B.T.U. This gives a very indefinite idea in making comparisons of boilers as no certain per cent. of efficiency is standard. Recently the Boiler Manufacturers' Association decided that there should be ten square feet of heating surface to a horse power in a

1. Slightly abridged.—EDS.

horizontal tubular boiler. The problem then for the salesman is, how many heat units are needed to do the work. This number divided by 33,000 will give the horse power required. Allowance, of course, must be made for heat losses from steam pipes, etc., and also for any additional work which the boiler may have to do. It is difficult to give any rule for determining the number of heat units required, as each problem has to be figured out by itself, and the results considered in the light of past experience. Where coils or radiators are to be heated in places at ordinary living temperatures, 80 to 120 square feet can be taken as equal to 1-horse power. Where the coils are in dry kilns, 1-horse power will take care of a considerably larger surface. If the coils are in liquids, or steam used in jacketed kettles, it is better to disregard heating surface, and from the specific heat of the substance to be heated, figure the heat units necessary to bring it to the required temperature. In such a case the outside surface of the container must be counted in as radiating surface. In all these calculations the time element must be considered. The customer must decide the longest time he can take for the work, the longer he can give, the smaller the boiler required. Where air is to be blown over coils much more heat will be removed from them than under ordinary conditions. In this case disregard the coils and figure the quantity of air to be heated and the temperature to which it must be raised. For heating matrix tables, shoe machines, vulcanizers, etc., the weight and specific heat of the substances must be found, the heat units calculated, the machine itself being counted in as a radiator. In all cases a reasonable peak load must be allowed for starting work. Some operations which require 2 or 3 horse power when steam is first turned on, need only a fraction of a horse power after heating up. The salesman must find out how much he can let the steam pressure fall at these times.

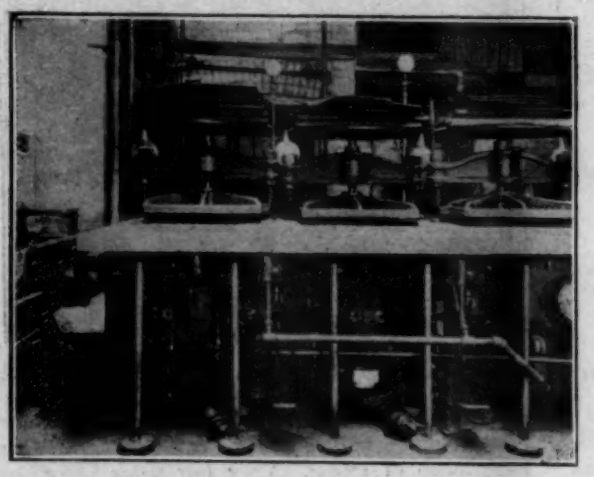


Fig. 2.—Two 3-Horse Power Boilers supplying Steam to Matrix Tables.

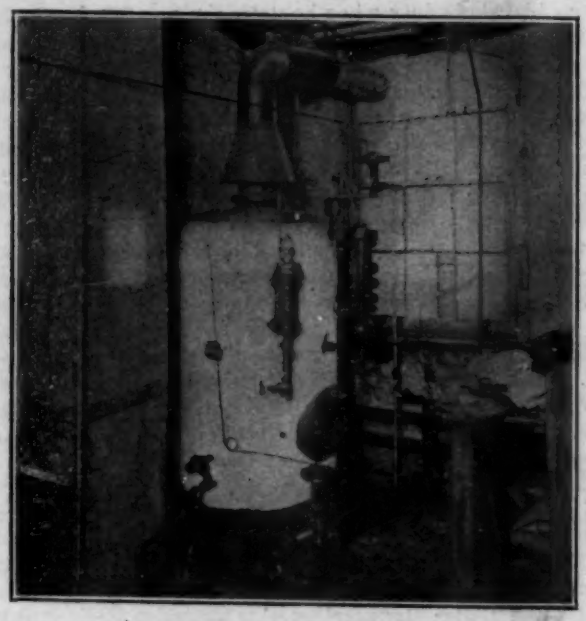


Fig. ?,—Six-Horse Power Boiler Supplying Steam to Hat Factory.

Occasionally it is possible where a machine is being used, to collect the condensation for a certain time, and weigh it. Then after learning the steam pressure at the inlet and the temperature of the weighed water, the steam used can be calculated. Where steam is allowed to issue from jets the amount required can be found by using a number of nozzles of known capacities at various pressures. These can be tried until the one which gives the required amount of steam with the valve behind it turned full on, is found. The amount of steam needed will then be known. A difficult thing is where you are called on to supply a boiler to heat an appliance which has been ordered but not received. If it is impossible to wait for the machine and no time for correspondence with the manufacturers, good guessing based on past experience, is about all that can be done.

Fig. 4.—1½-Horse Power Boiler supplying to jacketed kettle, making floor wax.

The more boilers a salesman sells, the easier it will be to decide the size required. After some experience he will frequently be able to tell at a glance what boiler will do the work. Selecting the type of boiler should not be much trouble. Practically all the good gas fired steam boilers suitable for industrial purposes are of the vertical fire-tube type, occupy little floor space and are self-contained. The steam space, of course, is only the volume of the upper part of the boiler, less the room occupied by the tubes. This extension of the tubes renders them somewhat liable to overheating, but, on the other hand, adds a little superheat to the steam, which is often an advantage. They are a very safe form of boiler if kept clean. Boilers not over 2 horse power to be operated at less than 15 pounds pressure, can be made of cast iron. Where the appliance is on the same floor as the boiler, it is often an advantage to select a boiler setting as low as possible. Unless all the condensation is to be returned to the boiler, hand holes should be provided for cleaning. The lowest pressure which will do the work with satisfaction is conducive to safety, and also to economy.

As a gas-fired boiler having a Bunsen burner must receive most of its heat by convection, it would seem advisable that it should have a somewhat greater heating surface than a coal fired boiler of the same horse-power, even taking into consideration the fact that the heating surface is easier to keep clean. It must not be forgotten that one of the great advantages of gas-fired boilers is that it is so easy to save labor with automatic devices. In almost every case it will be advisable to use a regulator to hold the steam pressure steady. This will save labor and result in increased economy. If the appliance to be heated is part of a steam loop system any other device is seldom necessary. Where the condensation is not returned and low pressure is used, a water feed regulator of the float-valve type may be installed with advantage. If the boiler is operated at high pressure, consideration should be given before it is decided to install an automatic water-feed, and if one is used a low-water alarm should be put on. It is advisable to heat the feed water either by a small water heater or an economizer can be placed in the vent. Where the condensation cannot be returned by gravity a direct return steam trap may be used. Good judgment must decide which devices are necessary, or such a high cost will be piled up that the order may be lost.

Assuming that the customer has decided to purchase a boiler, most industrial gas men admit that it is highly desirable that it be installed by the gas company's men, who should make all connections, including the steam to the appliance.

The question of safety can hardly be emphasized too much, as many are inclined to think that because the boilers are small they are not

dangerous. It has been said that a cubic foot of heated water at 60 or 70 pounds pressure contains as much energy as a pound of gunpowder, or enough to raise its own weight nearly a mile; so if a boiler should explode it would not make much difference to a bystander whether it was 1 or 100-horse power. Every boiler should be provided with a reliable safety valve. It is sometimes placed on the steam riser, but this is an objectionable practice, because if the boiler should prime, as upright boilers are liable to do, any dirt or scum on the surface of the water may be carried into the safety valve, possibly causing it to stick. It is desirable that the water gauge should be protected by a suitable fitting, to prevent injury from flying fragments, in case of breakage. Gauge cocks should generally be at tached, even if there is a glass water gauge. If a boiler is attached with short connections to a single appliance on the steam loop system, they may be dispensed with.

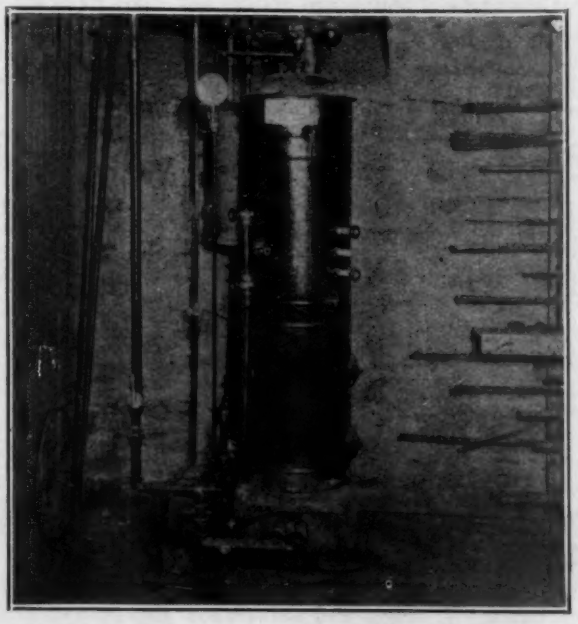


Fig. 5.—6 Horse-Power Supplying Steam for Vulcanizing Tires.

Every boiler should be provided with a pressure gauge having a range at least 25 per cent. higher than the safety valve load, and it should have a syphon to prevent injury to the gauge by heat. No boiler should be without a good fusible plug. A check valve should be inserted between the feed valve and the boiler, unless the boiler is only to be used for very short periods. The internal feed pipe should be above the bottom of the tube sheet, so that in case the check valve leaks, all the water in the boiler would not be discharged; and also because the introduction of the feed at the bottom of the boiler is liable to chill the metal and cause damage. However, it should be below the lowest safe water line, because if water is discharged in the steam space, water hammer will be caused. For the above reasons the returning condensation should be fed either through the same pipe or the blow off pipe. Each boiler should have a blow-off cock of a type easily opened and closed, connected direct to the lowest water space.

The steam riser should have a valve close to the boiler. If it is liable to collect water, provision should be made for draining it. All steam pipes to appliances should have a good fall, preferably in the direction of the steam flow. They should be free from traps above the water level of the boiler. Any insulation on the boiler should be put on so that it can be removed for inspection.

The adjustment of the gas burner is an important matter. It must have sufficient head room, so that with the greatest consumption, combustion will be perfect. There must be sufficient secondary air to insure complete combustion, but as little excess as possible. The gas orifice must be large enough to supply sufficient gas, even at the lowest city pressure. If the gas pressure fluctuates widely a governor may be used. The higher the flame temperature the more completely available will be the heat generated, so the primary air shutter must be adjusted to give the hardest flame practicable. If an automatic gas regulator is used, there should be a by-pass, locked to give sufficient gas at the lowest pressure to prevent flashing back in the mixer. Care must be taken to adjust it low enough that when little steam is being used, the steam pressure will not climb and open the safety valve. It is hardly necessary to say that the service, meter and riser should be large enough to insure good pressure at the burner. Is anything is to be scimped, let it be the service. It is worth trying to use a service already in, if only a trifle small. Vent connection is usually made to a chimney, but may sometimes be dispensed with. A draft hood should be used to prevent excessive draft.

After the boiler has been installed, tested, and found to do the work satisfactorily, the purchaser and a careful workman selected by him should be instructed how to look after it. It is sometimes claimed that no engineer is required with a gas-fired boiler. While it is true that the labor of looking after it is very small, still it does require some attention, and that of the right kind. One person should be made responsible for its care, and then instructed on the following points:

Before getting up steam observe the water level and see that it is at the proper height; note the pressure gauge and try the safety valve to see that it is free. The blow-off cock should be examined to see that it is tight. When steam is up, the water gauge should again be observed and blown through by top and bottom cocks. Note the water level in the glass after blowing—the water should rise in a lively manner; sluggishness points to choking and danger. If the boiler has gauge cocks they should be tried. Test the safety valve by lifting, and observe the pressure gauge. The feeding of the boiler should be done as regularly and continuously as possible, and it is desirable to heat the feed water. Apart from other serious objections the water level should not rise above the top or fall below the bottom of the water-gauge fittings, as the openings are liable to be closed with scum. Although authorities say that deficiency of water does not cause as many explosions as is commonly believed, the greatest care should be taken to keep the water at a proper level and maintain gauges and feed apparatus in good order. If an attendant finds the water out of sight in the gauge, everyone should withdraw from the vicinity of the boiler at once and the gas be shut off at the meter, as a serious accident is about to occur. If water gauge has a protector it should be kept clean. Leakage about the gauges should have prompt attention. No leakage about a boiler, however, should be tampered with while steam is on. The water gauge should be tested at least once a day while the boiler is at work. See that pressure gauge is always in order. The safety valve should be tested at least once daily to see that it works freely and at the proper pressure. It should be cleaned and lubricated with graphite whenever the boiler is cleaned. If condensation is not returned to the boiler the blow-off cock should be opened at least twice a day. It should be fully opened and closed reasonably fast, but not with a jerk. It is very important that it does not leak.

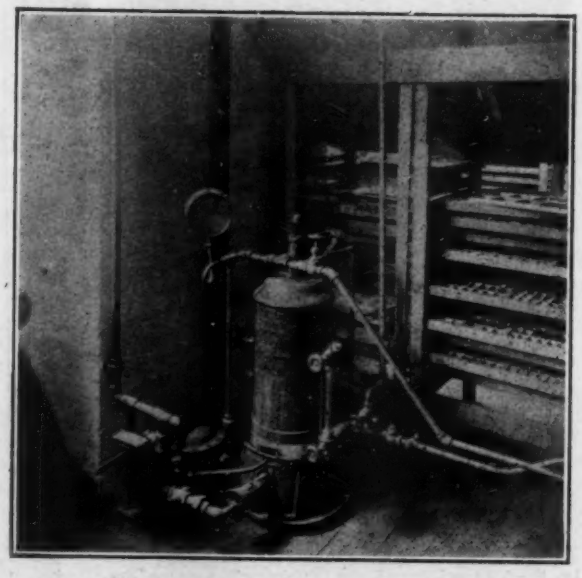


Fig. 6.—½ Horse-Power Supplying Steam to Embossing Press.

As already mentioned, vertical gas fired boilers are very safe, provided they are kept clean. This is important, as any sediment usually settles right over the fire. The economy of returning all the condensation is between 5 and 10 per cent., but its greatest advantage is in keeping the boiler clean. Generally speaking, a boiler which does not have the condensation returned should be cleaned out after every 100 hours' work. The hard scale should not be allowed to be-

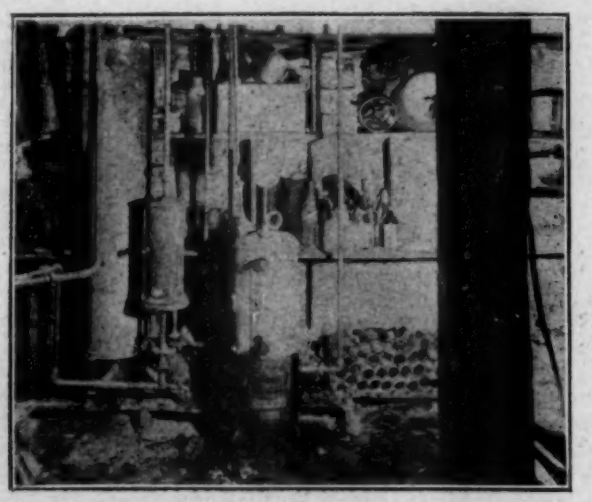


Fig. 7.—Small Boiler Used to Supply Steam for Sterilizing Milk Cans.

come more than $\frac{1}{16}$ of an inch thick. Scale is objectionable because it hinders transmissfon of heat, thus causing high fuel costs and danger of over heating; and conceals any corrosion which may be going on beneath it. A boiler should not be emptied for cleaning by blowing out under pressure. This is a serious strain on the seams, and bakes the scale on the hot metal. It is still more objectionable to blow off this way and immediately run in cold water. The boiler should never be opened for any purpose unless certain that all steam pressure is off. When opened for cleaning, the fusible plug should be cleaned inside and out and any incrustation removed; otherwise the plug is of little value. All boilers suffer if feed water is bad. There is no chemical compound suitable for all waters, and the indiscriminate use of boiler composition is a needless expense and results in damage to the boiler. The chemicals which are least harmful are washing soda or the pure soda lye; but their use does not render cleaning less necessary. The best way is to return the condensation to the boiler. The tubes, lower tube sheet and burner are important things to look after.

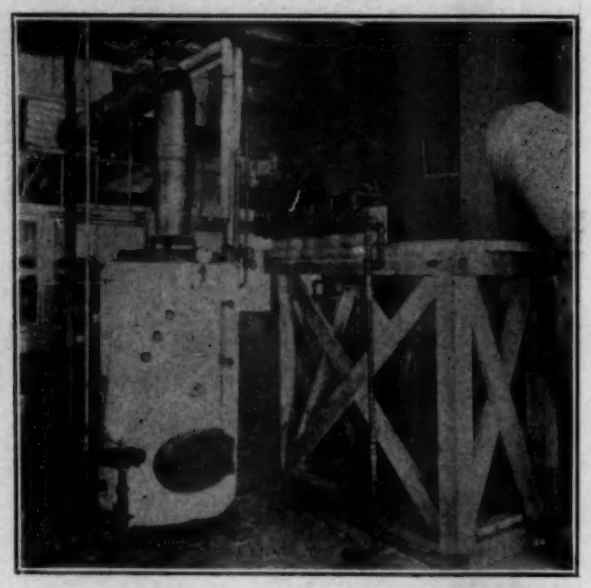


Fig. 8.—8-Horse Power Boiler Supplying Steam to a Large Drying Coil.

If laid up for the winter, the boiler must be emptied and cleaned. Quick lime should be placed on trays in the bottom to absorb any moisture, the boiler then closed and made as air-tight as possible. The pressure gauge, with its syphon, must also be emptied. The external parts, including tubes and fittings, should be cleaned and painted with a mixture of tallow and white lead. Many small boilers do not have handholes, so lime cannot conveniently be put in them. In this case the boiler may be emptied, the fittings removed to allow a circulation of air, and stored in a dry place; or it may be kept entirely filled, providing the water is not corrosive and there is no danger of freezing. Have simple instructions typewritten or printed on a card and tacked up near the boiler.

The principal factors determing the safety of a boiler are:

(1) Its original construction, equipment and installation. The responsibility for these is with the manufacturer and the gas company.

(2) The proper maintenance and working of the boiler and accessories. After instruction, the purchaser must see to this.

(3) Regular inspection of the boiler and fittings. We recommend this done by a boiler insurance company.

It may be objected that too many precautions are recommended and that hundreds of boilers are getting along all right with hardly any care. The only way I can account for this is that the boilers are taken care of by the same Providence which is said to look after children and drunken men. It is a task indeed, but think of the pleasure it gives when taking a prospective purchaser to see a boiler already installed, to have the old customer help close the sale.

[Concluded from page 227.]

Liquid Gas.

By Nisbet Latta.

Concerning the products of liquefied natural gas, the U. S. Department of the Interior, in Technical paper No. 10, gives the following information:

The liquefaction of gases by pressure is not a new industry, but only recently has its application to natural gas been recognized as practicable. In the early seventies, J. J. Coleman successfully liquefies by pressure and cold, the gases made by cracking the shale oils of Scotland, and since then by the processes of Blau, Pintsch, Gray, Hastings-Brink, Swiss Liquid Gas Company, Schneider, Williams, Wolfe, Welski and others, gases made by cracking oils in hot retorts have been liquefied.

The yield of liquid products from compressing natural gas to liquefication was as follows:

Results of Compression and Cooling Tests of Natural Gas.

Pressure Exerted in Liquefaction (Pounds per Square Inch.)	Temperature of Cooling Coil at Inlet to Storage Tank. Degs. C.	Volume of Gas per Gram of Liquid. c.c.
415	2.0	600.9
430	4.0	.....
506	9.1	.....
600	77.5	478.1

Pressure of 415 pounds at 2° C.; of 430 pounds at 4° C.; of 506 pounds at 9.1° C.; or of 600 pounds at 77.5° C., liquefied practically the total volume of the gas being compressed. Assuming the liquid to be a mixture in which propane and ethane predominate (as indicated below) 1 gram of liquid will yield 500 to 600 cubic centimeters of gas at 0° C., and 760 mm. pressure; that is, 1 gallon of liquid will yield approximately 50 cubic feet of gas.

The following analyses are approximate and do not give a definite division of the paraffins. No method is known of separating individual paraffins in a mixture of several, unless means be employed whereby the total gas is liquified and the different paraffins separated by fractional distillation. No absorbant known will quantitavely separate paraffin from a mixture of several and not act upon the others. Consequently paraffins are determined as a whole by combustion, and their percentage found by a calculation made from the contraction in volume and the carbon dioxide produced by burning. By this method the two predominating paraffins are shown, but a small quantity of the others which may exist is not apparent. For instance, the crude gas which the authors compressed (analysis No. 2) is shown to consist of ethane and propane only. That methane and butane are also contained therein is evidenced by Analysis No. 5 and Nos. 9 and 10. Undoubtedly pentane and hexane were also present. Methane was found in the first portions of gas from each cylinder, but was not present as a liquid in the cylinders because pressures were not sufficient to liquify it. It was dissolved to a certain extent in the other paraffins.

The following table shows the composition of crude natural gas and of the voltalized liquid products of compression.

Kind of Gas.	Specific Gravity (a) (Air=1)	Heating Val per Cu. Ft. 0°C. and 760 mm Pressure B.T.U.	Composition.—Per Cent. Methane.	Ethane.	Propane.	Butane.	Nitrogen
1. Natural gas, Pa. & W. Va.	0.64	1,189	83.0	16.4	....	...	0.6
2. Natural gas, Follansbee, W. Va.	1.39	2,468	....	21.8	77.7	...	0.5
3. Residual gas after 50 pounds compression product has been removed	1.33	2,364	....	34.9	64.6	...	0.5
4. Residual gas after 250 pounds compression product has been removed	1.15	2,008	....	79.4	20.0	...	0.6
5. Gas from liquefied gas (400 pounds pressure, 0° C.).	1.01	1,808	3.8	95.0	....	...	1.2
6.	....	2,066	....	72.5	27.0	...	0.5
7.	1.28	2,214	....	52 1	46.9	...	1.0
8.	....	2,621	...	1.1	98.0	...	0.9
9.	1.02	1,816	4.7	94.9	....	...	0.4
10. Gas from liquified gas (400 pounds pressure 0° C.).	...	1,925	....	89.3	9.9	...	0.8
11.	....	2,108	....	67.0	32.5	...	0.5
12.	....	2,161	....	59.4	39.8	...	0.8
13.	....	2,708	....	....	89.2	9.9	0.9
14.	....	3,221	....	....	24.0	75.0	1.0

(a) By Effusion Method.

Analysis No. 1 is natural gas of Pennsylvania and West Virginia, used in Pittsburgh, Pa., for heating and lighting. This gas is not adapted to the production of gasoline, but the analysis is given for comparison with the Follansbee gas used in the production of gasoline.

No. 2 is crude natural gas from the wells at Follansbee before being compressed at the commercial plant there.

No. 3 is the gas left after the initial compression to 50 pounds.

No. 4 is the gas left after the final compression of 250 pounds. This residual gas is put back into the mains for distribution. Its high quality is evident from the heating value.

Nos. 5, 6, 7 and 8 show the composition of the liquid gas obtained from the experimental plant erected at Follansbee. A cylinder of the liquid gas was taken to the bureau laboratories and connected with a small gas meter. The yield of gas was measured, and four samples taken at regular intervals. This test was not finished owing to an accident to the meter.

Nos. 9, 10, 11, 12, 13 and 14 cover the analysis of the gas from the first portion released to the last that came from the cylinder. The gas was taken from the top of the cylinder, and the first or most volatile portion approximated ethane in composition. The gases next volatized contained less ethane and more propane, and, finally, in the last portion butane predominated.

For comparison with the analyses given above, properties of the paraffins ordinarily present in natural gas follow:

Name	Formula	Boiling Point. Deg. C.	Specific Gravity. At Different Temperature. (Water = 1.)	Specific Gravity. At 760 mm. and 0° C. (air = 1.)	Weight of 1 liter.	Heating Value per cu.ft at 0° C. 760 mm.
Methane....	CH4	—160	O .415 at 160° C.	0.5529	0.7150	1,065
Ethane.....	C2H6	— 93	.....	1.0366	1.3404	1,861
Propane....	C3H8	— 45	.....	1.5204	1.9659	2,654
Butane	C4H 10	1	.....	2.004	2.5914	3,447
Pentane	C5H 12	36.4	.627 at 14° C.	.....	.....	4,250
Hexane	C6H 14	68.9	.658 " 20° C.	.....	.....	5,012
Hepthane...	C7H 16	98.4	.683 " 20° C.	.....	.....	.....

Name	Illuminating value British Candle Power.	Liquefaction Point. deg. C.	Liquefaction Point. lbs.	Other Liquefaction Points. deg. C.	Other Liquefaction Points. lbs.	Calculated Volume of Gas (at 60° F. and 30 in. pressure) from 1 Gallon.	Therotical Volume of Air necessary to burn 1 cu. ft. of Gas. cu. ft.
Methane....	5.0	— 95.5 at 735		— 73.5 at 835		....	9.57
		— 81.8 at 807		— 131 at 98.4		....	....
				— 12 at 2,700		....	....
Ethane.....	35.0	+ 35 at 664		Ordinary		....	....
				Temp. at 890		....	....
		+ 34 at 738		— 4 at 676		53	16.75
Propane.....	53.9	+ 97 at 647		.....		45	23.92
Butane.....	....	.....		.....		37	32.10
Pentane.....	....	.....		.....		31	38.28
Hexane.....	....	.....		.....		27	....

One of our prominent engineers has made the following report upon compressed natural gas condensates:

Sample No. 2. This was a liquid said to have been produced from the gas by a small 2-stage compressor using a maximum pressure of 300 lb. Sample drawn from larger glass bottle, having rolled paper cork, in which the liquid is said to have stood throughout the previous week.

A portion of this sample was submitted to evaporation tests by Professor Crew, from whose data I estimate the approximate composition of the sample to be:

Pentane	21 per cent.	Heptane	29 per cent.
Hexane	45 "	Heavier components	5 "

This compositition corresponds to that of a very light gasoline—a good grade of gas-gasoline.

Sample No. 3. Same as No. 2, but said to have been left uncorked 12 hours, during which time it lost 1 oz. in weight, or 18 per cent. by weight.

A portion of this sample was tested by Professor Crew, from whose report I estimate the approximate composition of the liquid as tested to be:

Pentane	0.3 per cent.	Heptane	57 per cent.
Hexane	24 "	Heavier components	19 "

From these figures, the composition before the weathering test of 12 hours may be estimated approximately as:

Pentane	18 per cent.	Hexane	47 per cent.
Heptane	20 "	Heavier components	15 "

This composition corresponds to that of gasoline, somewhat heavier than the preceding.

Sample No. 4. Liquid with no description.

Approximate composition from evaporation test:

Pentane	1 per cent.	Hexane	10 per cent.
Heptane	22 "	Heavier Components	67 "

This composition corresponds to that of a mixture of gasoline and naphtha, with perhaps some kerosene, and would need to be refined to be marketable.

Gas Sample No. 2.—Said to be from 2,700 feet strata with rock pressure of 300 pounds per square inch after well had been capped 24 hours. Gas from well said to give a yield of about 6 gallons of gasoline per 1,000 cubic feet of gas when tested by means of small compressor. The volume of the sample was insufficient for tests by fractionation. Mariner & Hoskins tested it both by combustion methods and careful weighing. The first tests showed only traces of oxygen, nitrogen and carbon-dioxide. Both tests agreed in giving 20.8 as the molecular weight.

This molecular weight agrees with any one of the following pairs of gases, by volume:

A—Methane....	65.8 per cent.	and	Ethane.....	34.2 per cent	
B— "	82.9 "	"	Propane....	17.1	"
C— "	88.6 "	"	Butane	11.4	"
D— "	91.4 "	"	Pentane....	8.6	"
E— "	93.1 "	"	Hexane.....	6.9	"
F— "	94.3 "	"	Heptane....	5.7	"

At atmospheric pressure and 70° F. the non-methane component of these combinations is:

A....	27.7 pounds.	D....	16.1 pounds
B....	19.5 "	E....	15.1 "
C....	17.2 "	F....	14.8 "

Since the pressure at the well at the time the sample was taken has not been reported, let us assume that the gas was flowing from the well under the same pressure as when it was tested for the production of gasoline. Besides methane, it contains not a single other gas, but several of them perhaps all the seven mentioned. The mixture, however, under this assumption, will be quite similar to mixture "D," with about 90 per cent. of methane and from 16 to 17 pounds of non-methane gases. Of the gas 16 or 17 pounds can be commercially condensed by ordinary pressure and cooling; and since gas gasoline weighs at least 5 pounds per gallon, it is evident that the gasoline yield from a gas like this sample cannot be over 3 gallons per 1,000 cubic feet, compared with the reported yield of 6 gallons per 1,000. This indicates that the reported yield is too high or that the gas sample was drawn off while the well was under considerable pressure.

Let us now assume that the sample was drawn off while the well was under pressure of 300 pounds. The gas mixture will now correspond with mixture B or C, having say 85 per cent. methane by volume and about 18 pounds of non-methane gases. Of these latter about 15 pounds per 1,000 may be condensed, a large proportion of which will be liquefied natural gas, composed of methane, propane and butane, and the remainder will be gas gasoline. As the well grows older, the production of liquified products may expected to be larger per 1,000 cubic feet of gas.

Reverting to the subject of containers: The character and construction of these tanks or bottles has been developed with a view to increasing efficiency and reduction of weight. It must be understood that the latter fractions of this liquid product must be considered a gas and not an oil, having a specific gravity of 0.60 at 15° C., or 100° B. at 60° F. This, however, under conditions of storage at a temperature of 55° C. or 133°F., are what represent the maximum sum of temperature to which they could possibly be subjected, and would only reflect a pressure of 755 pounds. Inasmuch as pressures as high as 2250 pounds have been commercially used and successfully handled without difficulty for a number of years, it would be evident that this is still within the limits of practical service, and that it will be easy to supply in an efficient, economical manner, such tanks or con tainers as will effect service commercially efficient and with a wide factor of safety.

It may be well to make some comment on the burners used. For industrial apparatus they usually have drilled holes of, say, 1/64", a plurality of burners being used. It must also be remembered that this gas, by reason of its high carbon content, requires a great deal more oxygen than the ordinary gas burner is capable of supplying. For instance, a cubic foot of average natural gas requires ten or eleven cubic feet of air for complete combustion, but propane requires 25 cubic feet and butane 32 cubic feet. The flame from all these gases is short and intense in its heat, hence it is best applied to the short inverted mantle for illuminating purposes, rather than the long vertical mantle of ordinary practice. It should be borne in mind that "Liquid Gas" should always be withdrawn from the bottom of the container in order that the gas or liquid may be continuously homogeneous. This avoids stratification and prevents the necessity of varying the combustion mixture.

Along industrial lines there is a very broad field for liquid gas. Because of its very high heat units and its availability and safety it possesses great value for cutting, welding, brazing, soldering, annealing, and many other industrial purposes. For cutting and welding steel and iron, or for any other operation where extreme heat is required, it may be burned in combination with oxygen to great advantage. Since it has from 4 to 5 times the B.T.U. per cubic foot of ordinary city gas and about double the number of acetylene, and since it is at the same time free from the great danger of explosion incident to the use of the latter gas, the comparative value of liquid gas can be realized.

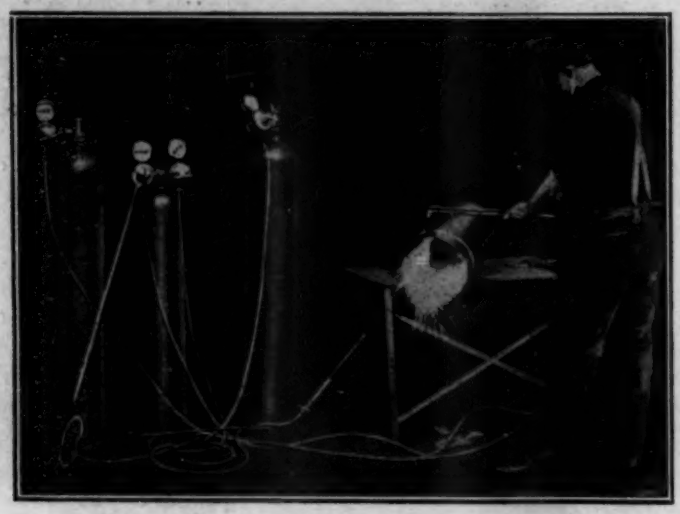


Fig. 6.—Cutting 10-Inch Steel Oil Well Casing with Liquid Gas.

Prof. O. H. Basquin, of Northwestern University, reports these comparative values:

Light.

The items set opposite each other will give equivalent light at the same cost to the consumer.

Electricity used in Tungsten lamps at 10 cents per kw. hour.	equals	Liquid gas burned in mantle at 10 cents per pound.
Kerosene burned in ordinary lamp at 7 cents per gallon.	equals	Liquid gas burned in mantle at 8 cents per pound.
City gas burned in mantle at $1 per M. cubic feet.	equals	Liquid gas burned in mantle at 4½ cents per pound.
City gas burned in open flame at $1 per M. cubic feet.	equals	Liquid gas burned in mantle at 18 cents per pound.
Gasoline burned in mantle at 20 cents per gallon.	equals	Liquid gas burned in mantle at 9¾ cents per pound.
Acetylene burned in acetylene jet—cost of carbide 3½c. per pound.	equals	Liquid gas burned in mantle at 12 cents per pound.
Blaugas burned in mantle at 10 cents per pound.	equals	Liquid gas burned in mantle at 10 cents per pound.

Heat.

The items set opposite each other will give equivalent heat at the same cost to the consumer.

Gasoline burned in gasoline range at 20 cents per gallon.	equals	Liquid gas burned in gas range at 3¾ cents per pound.
City gas burned in gas range at $1.50 per M. cubic feet.	equals	Liquid gas burned in gas range at 5 cents per pound.

Power.

Electricity used in motor at 10 cents per kw. hour.	equals	Liquid gas used in gas engine at 14 cents per pound.
City gas used in gas engine at $1.50 per m.	equals	Liquid gas used in gas engine at 5¼ cents per pound.
Gasoline carbureted and used directly in engine cylinder at 20c. per gal.	equals	Liquid gas used directly in engine cylinder at 4½c. per lb.

Liquid gas for power requires no carburetor; rapidly forms a uniform mixture; gives perfect combustion; gives clean cylinders with smokeless and odorless exhaust; gives 15 to 25 per cent. greater efficiency; is absolutely constant in quality.

Dr. Snelling discovered that acetylene, a gas that is by itself explosive when under pressure, is soluble in "liquid gas," and that ths solution is not of itself explosive. Mariner & Hoskins, commercial chemists, Chicago, were authorized to make a careful scientific study of this and spent several months on the work. The results are, in the language of Professor Basquin, as follows: "Acetylene gas, as now handled, must be dissolved in some solvent such as acetone, and the acetone itself must be held in some porous solid material, like asbestos, so that the container holds three different things, only one of which is used. Therefore, for each filling of a container with acetylene gas as now used, the transportation charge paid is as follows:

On weight of acetylene .... Single trip.
" " " acetone ..... Round "
" " " solid absorbent..... " "
" " " container.. ..... " "

In other words, seven fares are paid for one charge of combustible gas.

When "liquid gas" is used as a solvent for acetylene, no solid absorbent is needed, and the "liquid gas" drawn out with the acetylene is burned with it, so that the container is shipped back empty. The freight charge paid for one filling on the new system will, therefore, be af follows:

On weight of combustible solution.....Single trip
" " " container.....Round "

In other words, but three fares are paid for a charge of combustible gas.

In addition to the direct saving in freight charges, the light or heat from one filling of container, according to the new system, will be several times that given from one filling by the present system."

Simple plans have been worked out for utilizing "Liquid Gas" in isolated installations, some of which are illustrated.

For lighting streets and highways the lights can burn for several months without refilling the containers. The plan is to form a pit or chamber—say 30 inches across and 5 feet deep—to receive the containers and regulating valves, the top coming flush with the surface

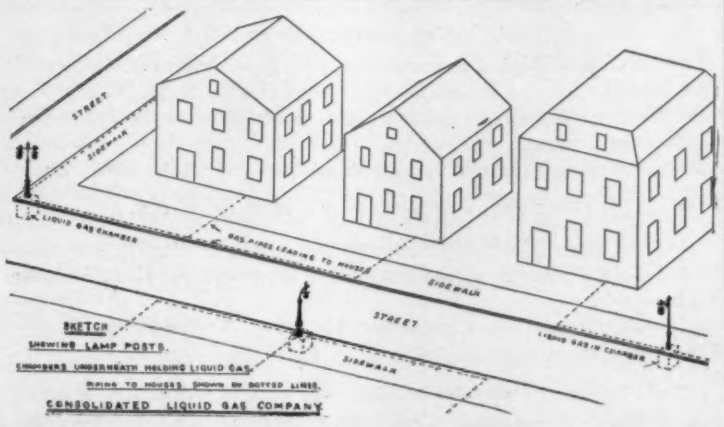


Fig. 3.

and a lamp post is placed near this. Gas is expanded by automatic devices in the supply chamber, piped at low pressure to the lamp post, and burned in mantles giving a most satisfactory light.

Lamp of 250 candle power will burn approximately 2 months.
" " 125- " " " " " 4 "
" " 60- " " " " " 8 "

Carrying this a step further, houses can be supplied from the same system by piping the low-pressure gas from the nearest supply chamber, and may be used for general lighting, for cooking and ironing, and for gas grate or heating stove.

Another simple and practical method which does away with even the small expenses of making the underground chamber is that of putting a cabinet, containing a bottle and a gasometer, alongside the house and supplying low-pressure gas to the house pipes for lighting or cooking. No changes in stoves or fixtures are necessary, except in the size of the orifices through which the gas passes. This hole is very small (about 1/1,000 of an inch in diameter), because the Liquid Gas is very rich, some of it having five times the heat units of city gas.

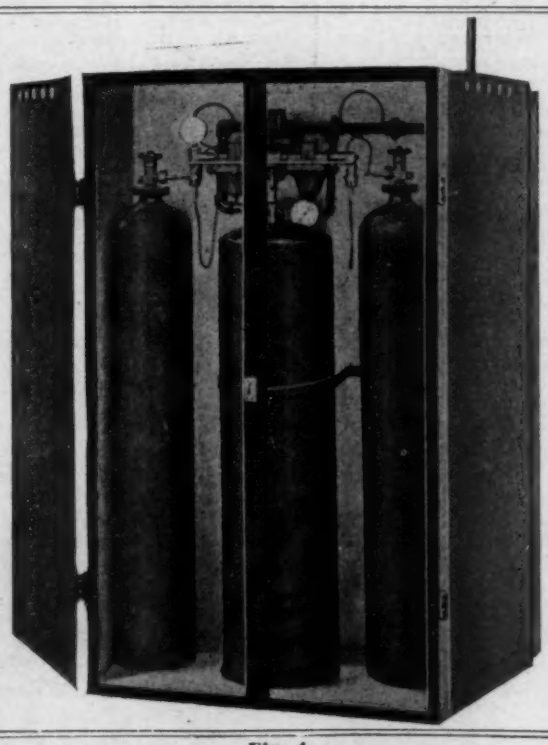


Fig. 4.

This plan is specially suited to an isolated residence. The owner receives containers by freight, connects them up in the cabinet, and returns the empty container for refilling.

As already noted, the expanding gas from the containers can be used for refrigerators.

Human life depends upon these things: water, food and heat. We must have heat in addition to water and food. That these should be obtained efficiently requires concentrating or compression for storage and transportation.

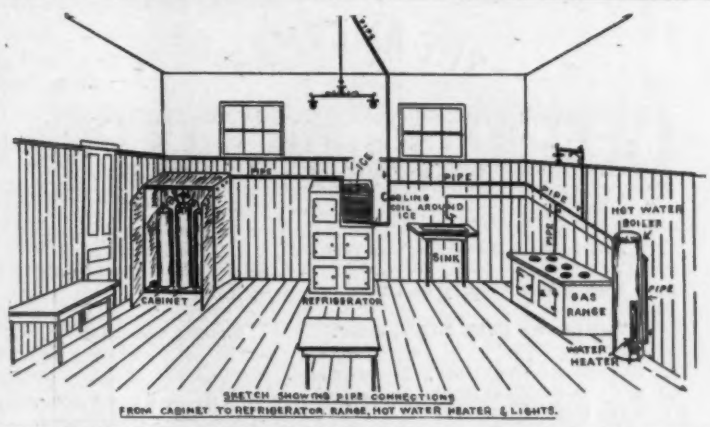
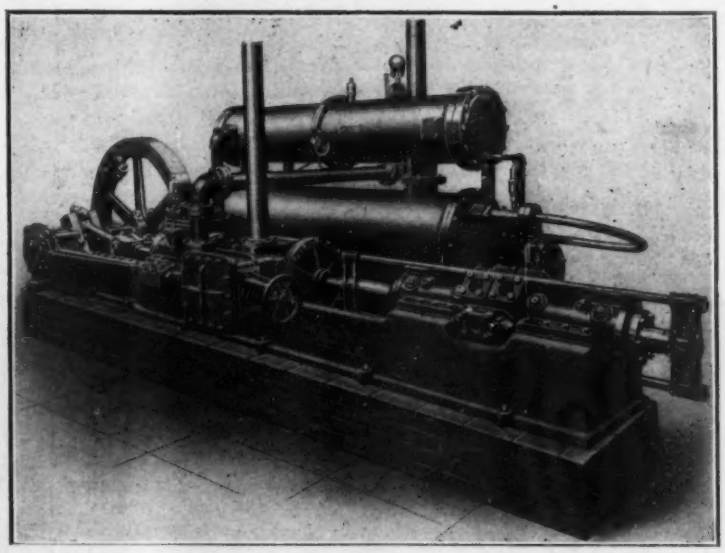
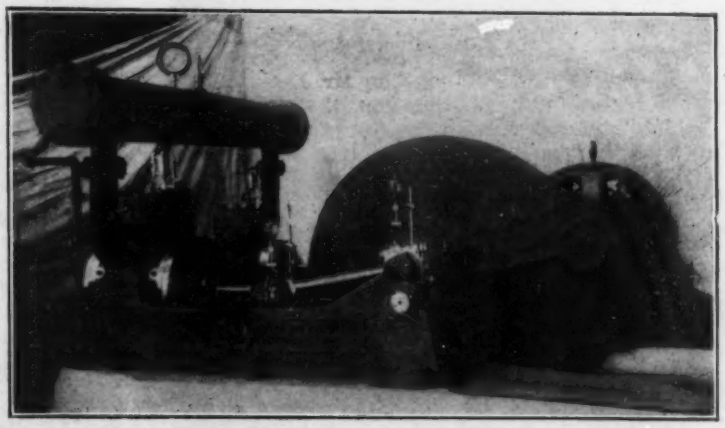


Fig. 5.



22 by 16 by 11 by 5½ by 18 Duplex Steam, Three-Stage Air Compressor. Displacement 460 Cubic Feet free Air per Minute at 125 R.P.M. Built for 1,000 Lbs. per Square Inch Working Pressure.



13 by 6 by 14 Two-Stage Cross Compound Gear Driven Hall Gas Compressor. Displacement, 265 Cubic Feet per Minute at a Speed of 125 R.P.M. Good for 850 Lbs per Square Inch Working Pressure.

A part of the power necessary for making "Liquid Gas" can be had by utilizing well-head pressure. This pressure is not constant and will probably have to be figured on the basis of a diminishing curve. This whole subject requires careful, accurate investigation and estimation. Whether ultimately the gas industry will not be purveyors, merchants rather than public servants is another thought. The matter of concentrated fuel is so important, due to present conditions, that it is our duty to give it full consideration.

JONAS LEAR has instructed his attorney to bring suit against the Borough of New Hope, Pa., to have it show cause why it does not compel the Bucks County Gas Company to extend its mains to the south end of the borough and have it furnish gas to all parts of the borough, as stated in the ordinance. Mr. Lear, in his statement, claims that the company is discriminating, and while it has made many promises, has not kept faith with the borough.

THE AMERICAN GAS LIGHT JOURNAL INC.

Entered at the Post Office, New York City, as Second-Class Matter.

Published weekly at 42 Pine Street, New York City.

Telephone Call, John, 2096. Cable, Am-Gas.

E. P. CALLENDER, President.
A. M. CALLENDER, Vice-President and Treasurer.
CHARLES H. WADELTON, Secretary and Manager.

SANFORD K. CAMPBELL, Editor.

Agents—American News Co., 11 Park Place, New York City.
Lemcke & Buechner, Berlin, Germany.
Aug. Siegle, 30 Lime Street, London, England.

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico, $3 per year. Canada, $4 per year. All other countries, $5 per year.
Single Copies, 10 Cents.

NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, OCTOBER 19, 1914.

[Official Notice.]

New Jersey State Gas Association.

Broad and Bank Streets,
Newark, New Jersey,
October 15, 1914.

In connection with the meeting of the New Jersey State Gas Association, to be held in the office of the Public Service Gas Company, Trenton, New Jersey, on Thursday, November 5th, 1914, the following program has been arranged:

"Indirect Indoor Lighting," by Mr. James P. Hanlan, of the Public Service Gas Company, Newark, N. J.

"Indirect Outdoor Lighting," by Mr. Jacob B. Jones, of the Bridgeton Gas Light Company, Bridgeton, N. J.

"Fuel," by Mr. Stanley Grady, of the Roberts & Mander Stove Company, Philadelphia, Pa.

"Heating," by Mr. William H. Schofield, of the Sanitary Heating Company, Brooklyn N. Y.

The above subjects will come under the general head of "Specialization of Effort," which we trust will prove interesting and beneficial to our members and guests. O. F. Potter, Secretary.

BRIEFLY TOLD.

American Gas Institute Convention.—The tentative programme for the three days' session is as follows:

Wednesday, October 21, 10 A.M. to 12:30 P.M.

Institute Meeting—Auditorium.

Report of Board of Directors.
President's Address.
Committee Reports.
Other Institute Business.

Wednesday, October 21, 2 to 5:30 P.M.

Manufacturing Section—Auditorium.

Refractory Materials, by Herman Russell, Chairman.
Oil Tar Separation, Recovery and Disposal, by R. E. Wyant.
Coal Gas Residuals, Feld Process, by F. H. Wagner.
Operating Experiences under a Calorific Standard. Symposium.
Efficiency Relation Existing between Various Test Burners, Argand and Open Flame, by F. H. Gilpin.

Distribution Section—Room No. 2.

The Welding of High Pressure Mains, by J. D. Shattuck.
The Installation and Maintenance of Services, by R. B. Duncan.
The Installation, Repairing and Testing of Meters by a Small Company, by Charles Otten, Jr.
The Improvement of Distribution Employees, by C. E. Reinicker.

Thursday, October 22, 10 A.M. to 12:30 P.M.

Manufacturing Section—Auditorium.

The Year's Progress in Carbonization Methods, by E. L. Spencer, Chairman.
Carbonization in Bulk, Kopper's Ovens, by C. J. Ramsburg.
The Operation of Inclined Retorts, by Frank Huber.

Chemical Section—Room No. 911.

Gas Chemist's Hand Book, by W. H. Fulweiler.
An Electrical Process for Detarring Gas, by F. W. Steere.
A Method for the Determination of Hydrogen Sulphide in Gas, by A. B. Way.
A New Recording Calorimeter by C. H. Stone and W. H. Hinman.

Distribution Section—Room No. 2.

The Proper Specifications for, and Inspection of, Interior Gas Piping, by A. E. Turner.
Piping of Large Buildings for Gas, by O. H. Fogg, Chairman.
Utilization of Gas Appliances, by W. J. Serrill, Chairman.

Accounting Section—Room No. 3.

In Rate Fixing by Commission, Should Depreciation be Deducted from Plant Valuation, by A. C. Humphreys.
Accounting for Depreciation, by Harold Erickson.

Thursday, October 22, 2 to 5:30 P.M.

Manufacturing Section—Auditorium.

Methods and Facilities for Specifying and Testing Blowers, and Measuring Air and Steam Supply to Water Gas Generators, by J. M. Spitzglass.
Measurement of Gas in Large Volumes, by Dr. J. F. Wing, Chairman.
Purifier Installations, by C. E. Paige.
Care and Maintenance of Gas Holders, by J. H. Braine.

Chemical Section—Room No. 911.

Ammonia Purification, by V. von Starzenski.
The Fusibility of Ash in Coals Used in Gas Making, by Perry Barker.
The Mode of the Decomposition of Coal by Heat, by Dr. H. C. Porter.
Gas Manufacture from the Point of View of Physical Chemistry, by W. F. Rittman.

Illumination Section—Room No. 2.

Illumination by Gas, by C. O. Bond, Chairman.
The Physical Installation of Gas Arcs, by C. A. Luther.

Accounting Section—Room No. 2.

Compensation of Meter Readers, by H. C. Schaper.
Printing and the Care of Printed Stock, by W. P. Baylie.
An Extension of the Dewey Decimal Classification System to Gas Engineering, by D. S. Knauss.
Rate Making, by William McClelland, Chairman.

Friday, October 23, 10 A.M. to 12:30 P.M

Institute Meeting—Auditorium.

Unfinished Businesss.

Illuminating Engineering Society.—The annual meeting of the Illuminating Engineering Society was held in the Engineering Societies Building, 29 West 39th Street, New York city, on Thursday, 8th inst.

The President, Mr. Charles O. Bond, called the meeting to order at 8 o'clock, and the General Secretary read the report to the Council, reviewing the work of the Society and its committees of the past year. The report showed a net gain in membership of 75 members and 14 sustaining members, the total membership of September 30th, 1914, being 1,507.

Mr. Bond, after a short address, retired from the chair, his term of office having expired. In his remarks Mr. Bond said, "that the work of the Society was in the nature of missionary work, its object being to bring the new light sources to the attention of the public; and to educate them in the proper use of light."

The introduction to office of the newly elected President was next in order, Mr. Wm. J. Serrill and Mr. P. S. Millar escorting the President-elect, Dr. A. S. McAllister, to the chair.

Dr. McAllister spoke briefly saying that there were two problems confronting the Society; one being an external problem and the other an internal problem. The external was the extending of the influence of the Illuminating Engineering Society, which might be done in two ways—co operation with other societies and education, popular and collegiate. The internal problem was the management of the affairs of the Society, in itself no small task or lacking in importance.

Following the remarks of the President, the meeting adjourned.

POWER TO FIX RATES.—Judge Remster, of the Marion County (Ind.) Circuit Court, has decided that under the public utilities law, the city of Indianapolis has the right to enter into a 10-year street-lighting contract with the Merchants Heat and Light Company, but that the power to fix the rates for the service is vested exclusively in the public service commission, and that the city has nothing to do with the making of rates, but can decide all other terms and conditions of the contract.

"It was the evident intention of the Legislature," said Judge Remster, "to vest the power of adjusting rates, so as to make all rates fair and just to all concerned, and avoid any discrimination whatever, in the commission. This would seem to apply to public service as well as to private service. It would not seem to have been the intention to have two bodies with rate-fixing power, one for public and one for private service. In such case there might be a conflict of rates, which would bring about discrimination. The municipality for public service might produce such a low rate as would require a higher rate for private consumers, or vice versa, and no authority would be vested anywhere to correct the abuse. Consequently the enactment would seem to have withdrawn from the municipality the power to fix rates by contract.

"The fixing of the rates is wholly within the power of the commission, regardless of the contract, and, if the rates filed with the commission by the defendant company before entering upon the service are subject to change, up or down, by the commission, then the presumption prevails that the rates filed and charged from time to time will be the lawful and just rates. The commission may adopt such rates or change the same whenever its power is invoked or in the place thereof substitute and fix other rates, and, when so fixed, such rates become the lawful rates, regardless of the contract. That it is within the power of the commission at all times to fix the rates there can scarcely be a doubt, and this power cannot be abridged by a contract entered into by the server and the served. In such cases the exercise of the power by the commission provided in the act would be left untouched and in full force and effect regardless of what the parties may have contracted on this subject. This being true, the defendants will be governed by the commission as to the rates to be charged for the service, and when such commission fixes the rates they will be the lawful rates, and those fixed in the contract may be disregarded as surplusage to the contract."

HARD ON UTILITIES.—"The present regulations and control of the public utilities of the United States is much too far-reaching and autocratic," was the tenor of the address by Dr. Alexander C. Humphreys, President of Stevens Institute, before the Traffic Club of New York. Of the forthcoming rehearing of the freight rate case he said:

"It is encouraging to learn that the Interstate Commerce Commission has decided to reopen the the railroad rate case on October 19. It is to be noted, however, that the commission will consider only evidence originating subsequent to the closing of the previous case. It would be more encouraging and indicate a more honest desire for fair play and co-operation if no such limitation were placed upon the admission of evidence. And why postpone this action to October 19? Why should the commission hedge in its precedure by court rules, particularly in a time of threatening emergency and when the conditions are completely abnormal? It is not alone the credit of the railroads which is at stake, but the credit of the nation."

THE ECONOMIC INJUSTICE OF MUNICIPALLY OWNED PLANTS.—The Duluth, Minn., *News*, says: "The city of Duluth pays for the water and gas it uses from the municipally owned plants. It also pays a one-half mill tax for the nominal purpose of reducing water rates to consumers, about $26,000 annually. On their side the plants pay no taxes or other revenue to the city. Why, then, should the general taxpayers, many of whom do not have, because they cannot get either water or gas service, pay anything to the support of these plants? It would seem to be plain business sense that a city-owned utility should pay its way; that there should be no general tax for its support. The Duluth utility department estimated its net earnings for 1913 at $120,000. From this it did not set aside a dollar for either depreciation charge or sinking fund to pay bonds.

Extensions are assessed against the property frontage, which relieves the department from keeping an extension fund. The commissioner says he has $85,000 which his department does not need for its own use, the department being more than self supporting according to its own statement. Why should it not support itself? Why should the city as a whole be taxed a single dollar to merely increase a surplus?

The city should pay for the service it gets just as the private consumers. But there is no possible reason, no possible rule of business or fair play that should assess the city a dollar beyond this. If it is a business proposition and an economy, as is claimed, it certainly must be able to pay its way; and not to do this while untaxed and bonused by a special tax, is an imposition on the general taxpayer, who has enough else to pay for in city affairs and already pays full value for this water and gas service.

THE D. R. RUSSELL ENGINEERING AND DEVELOPMENT COMPANY.—Announcement is made that Mr. D. R. Russell has resigned from the presidency and directorate of the Parker-Russell Mining and Manufacturing Company, and formed the D. R. Russell Engineering and Development Company, with offices in the International Life Building, St. Louis, Mo. Mr. Russell is President and General Manager of the new company, which has purchased the business and good will of the Retort Bench Construction Department of the Laclede-Christy Clay Products Company. The business of the new company will be the designing and installing of gas benches of every description; and the building of fully equipped retort houses, and complete gas plants.

Mr. Russell will devote his entire attention to this company, having completely severed his connections with all others of similar nature. No one man in this country has had wider experience, or occupies a higher place as an expert in retort work than Mr. Russell, and the success of his venture is assured.

THIRD AND TWENTY-FIRST PRESIDENT OF THE PACIFIC COAST GAS ASSOCIATION.—Unique in the annals of the gas industry in America is the history of the Jones family, the living head of which is E. C. Jones, chief engineer of the gas department of the Pacific Gas and Electric Company of San Francisco, and who has been again elected President of the Pacific Coast Gas Association after an interval of 18 years.

Having apparently absorbed the English idea of "like father, like son," four generations of the Jones family in succession, have been engaged in the engineering department of the gas industry and have become known throughout the country for the results each has achieved; and the family now has four members actively engaged in the gas business.

Mr. Jones' son, Leon B., 28 years old, assistant engineer in the gas department; Edward, 24, superintendent of the Sacramento works; and Dwight W., 20 years old, a cadet engineer in the San Francisco office.

The grandfather of the present "Chief," Joseph Jones, was a Welshman, one of the pioneers of the industry, connected with the building of early gas works in both England and New England. He died in New England in the early '30's, active in his profession until the time of his death.

His son, Edward Jones, built the Richmond, Va., gas works in 1852, the first municipal gas works in the United States. He also built and installed the works in South Boston, Worcester and Cambridge, Mass., and at Providence, R. I. He settled in South Boston and became the engineer in their work in the latter part of 1853, holding that post to the time of his death, in 1893. He went to the Boston gas works in 1834, when it was privately owned by James Robinson, and at that time there was only one gas lamp in the city, in front of the "Cradle of Liberty," Fanieul Hall.

The third generation went into the gas business as an apprentice at the South Boston works in 1876, became assistant superintendent in 1880, and 8 years later superintendent of the North End station, the works which his father had started in 1834. In 1891 he went to California as assistant engineer of the San Fransisco Gas Light Co.

In 1893, J. B. Crockett and E. C. Jones sent letters to every gas man on the coast questioning as to the advisability of establishing an association. The first meeting was held in the old office of the gas company on Howard street in 1893 with Mr. Crockett as president. Mr. Jones was the third president elected.

At the present time Mr. Jones is a director of the American Gas Institute, president of the Pacific Coast Gas Association, member of the American Society of Mechanical Engineers, and a delegate from the coast organization to the American Gas Institute in the interests of the international congress.

"Standard Methods of Gas Testing."

By C. W. Hinman.

The introduction to this circular of the Bureau of Standards is quite interesting. It first says: "The need for an American publication which can be accepted as a standard guide to the methods of testing gas distributed for illuminating and heating purposes has been indicated by the inquiries which are frequently addressed to the Bureau of Standards. This circular has been prepared with the hope of meeting this need." Also: "In the present circular, no attempt is made to fix upon a single method to be used in every case. * * * However, satisfactory results may be expected only if such methods are used as have been critically examined by experienced workers and found to be trustworthy. It will be the function of this and of later editions of the circular to collect and summarize the experience of gas chemists and inspectors in order to assist them in obtaining satisfactory results. The methods included in this circular are intended primarily for use in official testing and in works' laboratories which are checked by city or state inspectors. In each case as much freedom in choice of method is allowed as seems permissible." And later: "This publication is intended to present only standard or accepted methods which have been found satisfactory in the laboratories of the Bureau or by experienced gas testers elsewhere."

These extracts seem to imply that there is no satisfactory American handbook of gas testing in existance; that State, city and company inspectors are using faulty methods of testing; that these inspectors are not competent to select proper methods; that the Bureau of Standards is competent to select suitable methods; that only the methods selected by the Bureau should be used; and that the Bureau is empowered to make the selections. But an examination of the Bulletin does not lead one to the conclusion that these implications are axioms.

For some reason the Bureau ignores "The Practical Testing of Gas and Gas Meters," by C. H. Stone, published by Wiley in 1909. This omission seems strange, as Mr. Stone is a graduate of one of the best scientific schools in the world, and had many years experience as a State gas inspector before be wrote the book. He described the methods used by the State gas inspectors of Massachusetts and New York as well as various other processes used in gas inspection. The book has been favorably noticed and has not received any adverse criticism. It is hard to see why this book should not be considered a standard, unless the Bureau calls no work standard unless it be produced by them.

Committees of the American Gas Institute have also published reports on calorimetry, photometry, and meter testing; and these committees have been composed of experts who not only have received sound scientific and technical training, but have spent years in the active practice of their specialties. Most people would consider the works of these specialists standards.

It requires considerable assurance to imply that "United States" scientists are necessarily superior to state or city experts; but perhaps the Bureau does not allow that state or city gas inspectors are or have been expert.

It must be remembered, however, that the first state gas inspector (1861) was William Barton Rogers, one of the foremost scientific men of his day, who afterwards organized the Massachusetts Institute of Technology and became its first president.

It has not yet been proved that the staff of a magnificently equipped laboratory, but without actual experience as official or company inspectors, know more about gas testing than the men who have given years to the practice of this profession. The proper function of the Bureau would seem to be the testing and graduation of weights and measures, and perhaps instruments. Ruling on the use of them would seem to be outside its province.

Turning now to the method of testing recommended, we find a rather unequal treatment. In the section on calorimetry we find the subject well handled if accuracy only is to be considered and time is of no account. Some of the readings, e. g., the barometer and the meter thermometer, are directed to be taken one decimal place further than is necessary, and, in general, correction is carried out with a minuteness that gives an exaggerated impression of accuracy to the result. It may be said that if proper instruments were used and the inlet water is kept from 3° to 5° below the temperature of the room the observed result will, in the large majority of cases, be practically the same as though all the corrections were applied and all the refinements used. It might take a week to certainly determine the calorific value of a gas within one B.T.U., while an hour would be ample time for making the determination with 5 B.T.U.

Under photometry the Bureau well says, "candle power is not a definite property of the gas as heating value is, but represents a performance which depends on the conditions of combustion as well as on the quality of the gas." Generally the remarks and directions concerning the photometer and its accessories are in accord with modern practice, but reflection and screens have not received adequate treatment. By far the brightest spot in the observers field of view should be the disk. The various scales, and the note book should be illuminated just enough to be easily read, and all other objects should be in obscurity. This is the ideal condition, but one often finds that light is reflected from the bar and the thick edges of the screens between the lights in sufficient quantity to seriously affect the observation. The bar itself should be totally screened and the edges of the openings in the screens sharpened to knife edges.

Attention is called to the effect that variations in atmospheric conditions exert on the candle power, in the remarks on ventilation, atmospheric pressure, temperature and humidity.

The various standards of light, their advantages and disadvantages, are well described. It is believed that an experienced observer using standard candles would obtain results of greater accuracy than the Bueau is disposed to admit.

Many causes tend to vary candle-power determinations and make variations likely; but the greatest variation is from the burners used. Ordinary 15-candle power coal gas burned from a common open burner will give about 2-candle power for each foot, 3 candles from a good Argand, 15 to 20 from a common mantle burner, and up to 60 candles per foot of gas when properly mixed with air and burned under high pressure.

The Bureau recommends for testing all gas an open burner that is especially adapted to 20–25 candle water gas. If this suggestion is adopted by the inspector it makes his task easier, but his tests will not give a fair comparison between various gases, as this burner is not well adapted for gas of low candle power. A poorer gas that would give better results with a mantle burner and be nine-tenths as effective for heating purposes might, if the same open burner was used in testing both gases, show only half the candle power. There is no one burner equally well adapted to all gases. A burner suitable for a gas containing large quantities of carbonic acid and nitrogen is not suitable for a gas containing small amounts of these constituents. In general, a gas of about 20-candle power will show nearly the same result whether tested with an open flame or Argand burner; but a gas testing 15 in an Argand might show only 10 candles in an open burner. Some good Argand burner—the Metropolitan No. 2 or the Grafton "Ideal"—come nearer to doing justice to all the common grades of gas, but they are not suitable for domestic use. Mantle burners cannot be used for testing, as the light given depends so largely on the mantle used.

In Massachusetts the law, enacted in 1880, states that the gas shall be tested with "the burner best adapted to it, which is at the same time suitable for domestic use." The practice is to use open burners for testing the richer gases; but for poorer gas the authorities continue to use Sugg's London Argand, which is neither the burners "best adapted to the gas" nor "suitable for domestic use." The result of this is that the inspectors have to be provided with five different Sugg burners and chimneys of different heights.

The general use of mantle burners for lighting, open burners being used chiefly for occasional purposes, and of gas stoves for cooking render the rating of a gas by its candle power of little value. It would seem best in legal regulations to value gas solely by its heating value. The lighting value of a gas used in mantle burners is very nearly proportional to its heating value as determined by the calorimeter. The inspector should also make occasional tests of the candle power with some of the types of burners in common use, and the result of these, as well as of the legal tests, should be at once made public. The writer believes that immediate publication of the results of tests, even if no legal standard has been specified, is of more value than condensed publication a year or more after the tests are made.

The directions for taking the candle power are full, and calculated to guide the inexperienced observer. The direction to read the barometer to the nearest hundredth inch does not accord well with the later statement. "As a matter of fact, tenths of a candle are significant only when very careful work is done." Hundredths of an inch in the barometer reading mean an exactness of 1/3,000, while a tenth of a candle means an exactness of about 1/200.

It is neither desirable or practicable to so completely purify gas from hydrogen sulphide that a trace cannot be detected by a prolonged delicate test. The gas is sufficiently well purified if its presence cannot be detected by the sense of smell of the average person. The tests recommended by the Bureau meets this rather indefinite requirement perhaps as well as other similar ones in general use.

The Bureau describes the apparatus commonly used in determining the total sulphur; but makes recommendations for improving the apparatus that cannot always be approved. It recommends that the gas be passed for several hours through a wet meter before a test is made. A small three diaphragm dry meter is sufficiently accurate, and does not require such a long preliminary passage of gas before starting the test.

The Bureau is of the opinion that a gravimetric determination of the sulphuric acid obtained by burning the gas is more accurate than a volumetric method. This opinion is not shared by the State inspectors of Massachusetts and New York, who for many years have used with satisfactory results a volumetric method which the Bureau did not see fit to include in its investigation of methods. The only volumetric method tried by the Bureau was its own modification of a method not previously used in gas testing, and which seems less accurate and speedy than some others.

The Bureau describes a turbidimetric method for the sulphur determination, but it does not seem accurate enough for official inspection, although it might be valuable in works' control.

The Bureau correctly describes the Referee's method of determining ammonia, although there is now little need of making the test, as modern gas seldom contains an appreciable amount. For some reason no mention is made of the method used for many years by the Massachusetts and New York inspectors, although in "Technologic Papers No. 34" it is briefly described under the erroneous name of Lacey. The method described in Stone, pp. 145-148 is accurate to 1/10 grain with gas containing less than 10 grains per 100 feet, and is much simpler than the others. The Bureau especially recommends the use of an apparatus designed by it because of its excellent circulation of liquid, although they fail to show the advantage of the resulting immediate mixing which in the Massachusetts method is a decided disadvantage.

The Bureau assumes that the propriety of an official regulation of pressure will not be questioned, and has recommended elsewhere that a pressure of not less than 2 inches and not more than 4 be required. No doubt every gas company would like to deliver gas at uniform pressure at all times and places, and would do so if it did not cost too much. To enforce the proposed requirements would in many cases require a large outlay for mains and appliances, necessitate a serious disturbance of the streets and in all cases the employment of a large force of inspectors. This increased expenditure mu st finally be paid by the public; and it is believed that not even the Bureau of Standards is equal to the task of deciding how much money a company should spend in equalizing pressures.

Under the head of meter testing it recommends that all cubic foot bottles for testing provers be standardized by the Bureau of Standards. This recommendation should be heeded, as the Bureau is well fitted for the work, and is the proper authority in matters relating to weighing and measuring. It is not obvious, however, what authority the Bureau has for promulgating rules for the expenditure of money by a public service corporation.

Concerning gas analysis, the Bureau says, "At the present time the methods for the determination of some of the constituents of gas are very unsatisfactory; since the accuracy and interpretation of the results obtained is uncertain. It is feared that any recommendation included in the circular at this time would be of little value, but a careful investigation of the methods of gas analysis is planned for the near future. * * * After such investigaiion it is hoped that methods of analysis can be recommended which will give results of absolute as well as relative significance."

Whether the Bureau will ignore the work of Bunsen, Regnault, Faraday, Doyere, Frankland, Wurtz, Williamson and Berthelot, and some living chemists; and recommend apparatus and methods of its own devising is not known; its work on sulphur and ammonia is not reassuring.

DURING the past year the Western States Gas & Electric Company, Stockton, Cal., has made special efforts to secure new gas customers on existing mains, particularly large users of fuel, with the result that the Company's weekly outputs are now showing large increases over those of last year. For the week ending September 24th the gas output was 4,346,300 cubic feet, as compared with 3,418,400 cubic feet for the corresponding week of 1913, an increase of 26.8 per cent.

A New Standard Light Source.[1]

[A paper read at the Convention, Illuminating Engineering Society, by L. A. JONES.]

Standard light sources available for practical use in laboratory or testing work are limited in number, those most commonly used being the Harcourt pentane lamp, the Hefner standard, and electric incandescent lamps, carbon and tungsten, that have been seasoned and standardized. It is desirable in most work that the color of the light given by the standard be as near white as possible, and it is also very desirable, necessary in some work, that the spectral energy distribution of the source be known and constant. In addition to these qualities, the source should be simple to set up and operate and require little attention. The standard Hefner and the pentane lamps require continual attention to keep them in adjustment, and are very sensitive to air currents. The intensity is appreciably affected by the humidity of the atmosphere and by the purity of fuel employed. The color of the light given by them is decidedly yellow, and requires a dense blue filter to reduce it to daylight quality. These disadvantages are sufficient to exclude them from the list of available sources for practical use in laboratory and testing work. The incandescent electric standard, when properly operated, gives results of high precision, but the apparatus required to control and make the necessary current and voltage measurements is very expensive and complicated. Since the light intensity varies from four to eight times as fast as the current, the measurement of current must be made very precisely, usually requiring a potentiometer method in order to attain the necessary precision. The color of the tungsten standards is quite satisfactory, as it requires a filter of only medium density to reduce the light to daylight quality. But the difficulty of operating the standard at constant intensity, the expense of the apparatus necessary, and the complicated nature of the measuring apparatus make it cumbersome.

The acetylene flame has been used to some extent as a standard, and in many ways is remarkably well adapted to such use. The color is nearly white and requires a filter of only medium density to reduce it to daylight. The unscreened flame is almost an exact match in color with a tungsten lamp operating at 1.25 watts per mean horizontal candle power. The spectral energy distribution has been determined very accurately by Stewart and also by Coblentz. It is a simple matter to prepare acetylene gas of the required purity and to control and measure the gas pressure. The ordinary type of acetylene burner gives a broad flat flame which varies appreciably in color and intensity from the centre to the edges. Such a flame, if so screened that only a small area of the most intense portion of the flame is used as the light source, makes a fairly satisfactory standard; but since the screening diaphragm cannot be very close to the flame, errors due to parallax are likely to arise. Such a flame is also very sensitive to air currents and to the ventilation conditions of the box or enclosure in which it may be placed to shield it from air currents. A more satisfactory type of burner has been designed by Mees and Sheppard, and some data on the constancy of intensity has been published by them. This burner gives a long thin cylindrical flame not sensitive to air currents and with a very uniform intensity over several millimeters of its length.

The object of this investigation was to determine the reliability of such a burner as a light standard. A large number of photometric measurements were made on several burners of this type over a wide range of operating conditions. The intensity at various points along the flame and the variation of intensity with change of gas pressure was measured. From the results of these measurements the conditions tending to minimum variation of intensity were established. Such burners are not reproducible to the precision required for a primary standard, but must be standardized under fixed conditions by comparison on a photometer with some primary or secondary standard source.

Fig. 1 is a cross section of the burner used in the investigation. The burner tip, *A*, is of the Bray air mixing type taking ¼ cubic foot of gas per hour and giving a cylindrical flame about 3 mm. in diameter and 50 mm. high. The tip is mounted inside a cylindrical metal hood, *B*, with a rectangular opening, *C*, in one side. From the edges of this opening metal leaves, *L*, *L'*, extend inward to within about 2 mm. of the flame. The inner edges of these leaves form an aperture through which a short section of the flame is viewed, and as this opening is quite close to the flame, the possibility of parallax errors is reduced to a minimum. The aperture thus formed is

1. Slightly abridged.—EDS.

Fig. 1.—Vertical Section through Standard Burner.

approximately 3 mm. high and 10 mm. wide. Thus a section of the cylindrical flame about 3 mm. long is used as the standard light source. The acetylene used was produced in a Thorne and Hoddle generator from which it passed through a purifier containing bleaching powder and potassium chromate, and thence through a regulator that maintained the line pressure constant to within 2 per cent.

The standard lamps used in making the photometric measurements were 50-volt tungsten glow lamps operating at about 1.25 watts per mean hemispherical candle power. They were standardized at the National Physical Laboratory and the values in terms of the international candle were certified to 1 per cent. They were operated on a 60-volt storage battery, the electrical measurements being made with a Wolff potentimeter and a high sensibility galvanometer. The comparison method was used in the measurements, the comparison lamp also being supplied from storage battery and measured by the potentiometer. The photometric measurements were made on a 12 foot (3.65 m.) bench photometer of the N. P. L. type, using a Lummer-Brodhun contrast photometer head. The readings were taken with both standard lamp and acetylene burner unscreened, and although there was a slight color difference, it was not great enough to cause any appreciable error in the settings.

A set of six burners was used, the intensity of the light given being measured with the window at different distance above the top of burner tip and at various gas pressures.

In the curves, tables and text the following symbols are used:

I = Intensity of light in candle power.
P = Pressure of gas in cm. of water.
D = Distance (in mm.) between top of the burner tip and the middle of the window in the hood.
dI = Maximum deviation of any single determination from the mean.

TABLE 1.

Burner No. 3.						
	P = 8 cm.					
D =	16.9	18.5	20.1	21.8	23.4	25.0
Run No. 6	0.97	1.06	1.09	1.04	0.95	0.74
Run No. 7	0.89	1.03	1.06	1.04	0.98	0.76
Run No. 8	0.90	1.01	1.06	1.03	0.96	0.75
Run No. 9	0.98	1.06	1.05	1.02	0.94	0.75
Mean I	0.94	1.04	1.06	1.03	0.96	0.75
dI per cent.	5.3	2.9	2.8	1.0	2.1	1.3
	P = 9 cm.					
D =	16.9	18.5	20.1	21.8	23.4	25.0
Run No. 6	0.84	1.03	1.11	1.12	1.08	0.90
Run No. 7	0.81	0.98	1.10	1.10	1.08	0.96
Run No. 8	0.85	1.03	1.12	1.12	1.08	0.91
Run No. 9	0.78	0.94	1.06	1.10	1.09	0.98
Mean I	0.82	1.00	1.10	1.11	1.08	0.94
dI per cent.	4.9	6.0	3.6	0.9	0.9	4.2
	P = 10 cm.					
D =	16.9	18.5	20.1	21.8	23.4	25.0
Run No. 6	0.72	0.92	1.09	1.13	1.15	1.06
Run No. 7,	0.71	0.92	1.06	1.10	1.13	1.06
Run No. 8	0.72	0.87	1.04	1.06	1.14	1.03
Run No. 9	0.71	0.93	1.07	1.15	1.17	1.08
Mean I	0.72	0.91	1.06	1.11	1.15	1.06
dI per cent.	1.4	4.4	2.8	4.5	0.7	2.8

Average dI = 2.9 per cent.

Table I is a typical set of data on Burner No. 3, four complete runs made on different days by two observers. No test for the purity of the acetylene was made. In the process of recharging the generator some air was always introduced into the system, and its presence is indicated by a blue fuzzy tip of about 2 to 4 mm. at the top of the flame. No photometric measurements were taken until this blue tip had disappeared. In some cases 10 to 12 hours was necessary before this condition existed.

In Fig. 2 the data of Burner No. 3 is given in curves plotted with I as ordinates and D as abscissae. From these curves it is evident that for a minimum variation in I (between $P = 8$ and $P = 10$) the value

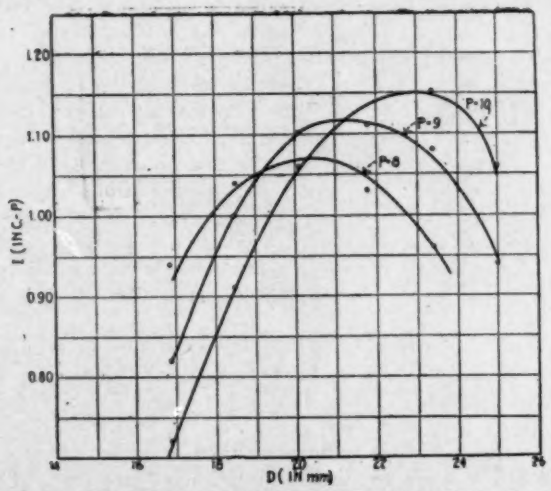


Fig. 2—Variations of Candle Power with Window Height at Different Gas Pressure.

of D is 20.1 mm., and in this position a change in pressure of 2 cm. (from $P = 8$ to $P = 10$) causes a change of only 2.7 per cent. in I. Since P can be easily controlled to 0.2 cm. it is evident that the corresponding variation in I will be so small as to be negligible in any ordinary work. It will also be noted from the curves that for $D =$ 20.1 mm. the best value of the gas pressure, P, is 9 cm. For if the values of I at the Point $D = 20.1$ be plotted against gas pressure P, it will be seen that the flattest part of the curve occurs at a point where the value of P is 9 cm. Hence for a minimum variation in I due to a change in P the value of P is 9 cm. In this way the best values of D and P for operating a given burner were established.

Two to six complete runs were made on each of the six burners, and a set of curves (of which Fig. 2 is typical) was plotted for each burner. From these curves the best values for D and P were obtained for each burner. These values are given in Table VII. in which the meanings of the symbols used are as follows:

Do = Best value for D (in mm.).
Po = Best value for P (in cm.).
Io = The value of I (in c. p.) when D = Do and P = Po.
A = Per cent. change in Io due to a change in Po of 2 per cent.
H = Height in mm. of window in hood of burner.
Io/H = Intensity in c. p. per mm. of flame.
dI = Per cent. deviation of Io/H from mean all burners.

TABLE VII.

Burner.	Do.	Po.	Io.	A.	H.	Io/H.	dI.
No. 1	17.6	9	0.98	0.05	2.95	0.332	4.8
No. 2	19.8	9	1.28	0.13	3.50	0.366	4.9
No. 3	20.1	9	1.10	0.18	3.20	0.344	1 2
No. 4	18.3	9	1.21	0.19	3.30	0.376	7.5
No. 5	18.1	9	1.09	0.12	3.23	0.338	3.0
No. 6	17.8	9	1.04	0.19	3.05	0.341	2.1
No. 2, Tip No. 5	18.1	9	1.18	0.20	3.50	0.337	3.3
No. 2, Tip No. 6	17.9	9	1.23	0.15	3.50	0.351	0.9
Mean				0.15		0.348	3.46

The variations in candle power under Io, are not entirely due to differences in the burner tips, but partially to height of window in the burner hoods. These heights were measured by means of micrometer microscope and the value of I per mm. of exposed flame (see Table VII.) for each burner was computed. As a check upon the determination of the best values of P and D some further measurements were made. The burner tip was removed from burner No. 2 and for it was substituted, one after the other, tips from burners No. 5 and No. 6. Sets of observations were made in each case as before, curves plotted and Do and Po determined. The results shown in Table VII. agree very well with those previously obtained for the same tips. In Fig. 3 is given a set of curves in which a wider range in values of D was used than is shown in Fig. 2, and hence these curves show more completely the relation between I and D for the gas pressures used. An inspection of these curves shows that in the upper part of the flame the variation in I due to a change of gas pressure is much more rapid than in the lower part, and that at the point D = 18 mm. this variation is a minimum within the range of pressures employed.

The quantity A in Table VII was computed in the following way: Take the data and curves on burner No. 3, Fig. 2, and Table I. For

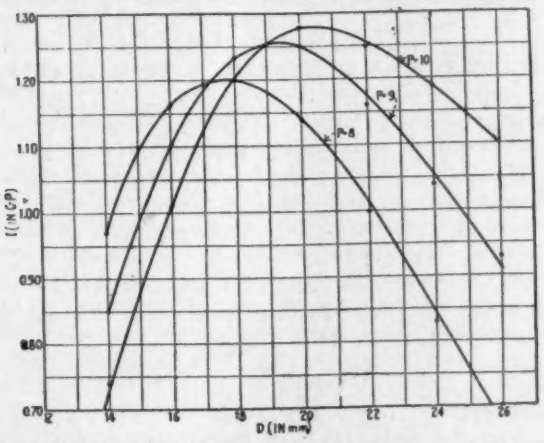


Fig. 3.—Variations of Candle Power with Window Height at Different Gas Pressure.

the best value of D, D = 20.1, the values of I for the various gas pressures were read from the curves. With these values a curve was plotted, Fig. 4, with I as ordinate and P as abscissae. From this

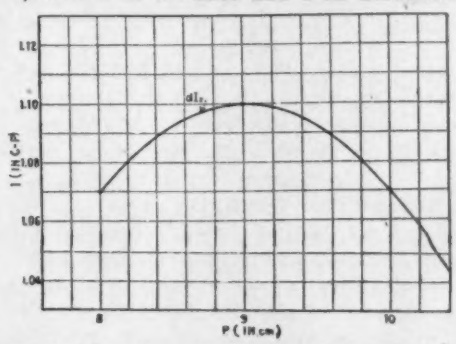


Fig. 4.—Variation of Intensity with Gas Pressure.

curve the value dI_s corresponding to Po ± 2 per cent. was obtained. This value of dI_s expressed in per cent. of Io is given under A in Table VII. for each burner, and is the per cent. variation in Io corresponding to a change in Po of 2 per cent. Since the regulator holds the pressure constant to 2 per cent., the quantity A is the maximum error in I due to a variation in P. Or in case a pressure regulator is not used it is quite easy, by means of a screw-actuated pinch cock and a manometer, to set the pressure at 9 cm. within the limits of ± 2 per cent.

In order to determine how soon after the lighting of a burner the intensity reached a steady condition, another series of measurements was made. Photometric readings were made rapidly immediately after lighting the burner, and the time of each reading recorded. Several such runs were made, care being taken that the burner had been allowed to cool to room temperature before lighting. The data so obtained was summarized, and is given as a curve, Fig. 5. This shows that only about 30 seconds is required for the intensity to reach a steady condition.

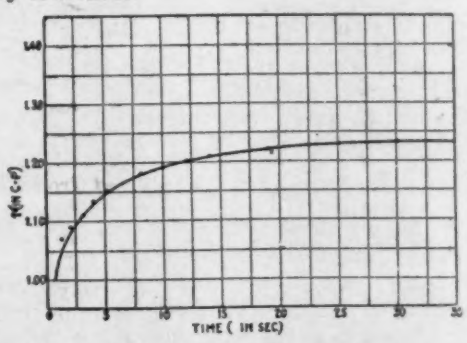


Fig. 5.—Variation of Intensity after Lighting.

The humidity of the air in the photometer room was observed on each day, but no variations in the intensity corresponding to changes in humidity could be detected. However, in case the burner is to be used in work requiring very high precision, a more complete investigation of this point should be made.

The inner end of the conical shaped window through which the flame was photometered was always close to the flame, so that the error due to parallax was inappreciable. Care was used to see that the axis of the burner was perpendicular and that the axis of the photometer passed through the center of the window in the burner hood. In setting a burner up for use after standardizing, a reasonable amount of care should be exercised, but small errors in duplicating position in which it was photometered may be allowed without introducing any appreciable error in the intensity.

The results of the measurements show that such a burner, when properly operated, is sufficiently accurate and reliable for all ordinary purposes. It is not a reproducible standard, but when properly adjusted and standardized makes a very serviceable secondary working standard, giving a good quality of whiteness and constant intensity with little attention on the part of the operator. It has the advantage over an electric incandescent stand lamp that the equipment necessary to operate and to control the intensity is much cheaper to install and simpler to operate. The only apparatus necessary to control the intensity is a water manometer, while with the electric standard some form of potentiometer is usually necessary to obtain the required precision. These burners have been in daily use in the laboratory during the past year and have proven very satisfactory. In use on the sensitometers the burner is placed in a large, well ventilated box, made of sheet iron, so that the flame is shielded from air currents. These burners, although designed primarily for use in photographic sensitometry, have been found to be very useful as working standards in other testing work, where a light source of constant intensity and of known spectral quality is required.

The advantages of this standard source may be summed up as follows: Constant intensity, light of good quality, accurately known spectral energy distribution, simplicity of apparatus required for operation, and the small amount of attention neceseary to keep in adjusiment.

There are still some points in regard to this type of burner that it would be of interest to investigate, and the author hopes to do something further along this line. The effect of humidity should be precisely determined, also that of atmospheric pressure, for these factors must be taken into account in the case of other flame standards such as the pentane lamp, when extreme precision is desired. The relation between the volume of gas consumed, the volume of air mixed with the gas in the burner tip, and the resulting flame intensity should be determined. It seems quite possible that if all the factors affecting the intensity were carefully analyzed that a primary standars of higher precision than any of those existing at present might be produced.

Gas Style Show.

The following is an article from the Minneapolis *Tribune* of October 4th:

Seven St. Paul women spent yesterday afternoon in Minneapolis discussing plans for entertaining 400 or 500 women who will visit the Twin Cities for a week about Dec. 1.

The meeting of this St. Paul committee was a part of the work for the entertainment of the National Commercial Gas Association, which will meet in the National Guard Armory the week beginning Nov. 30. There will be about 2,000 gasmakers and makers of gas appliances in attendance, and it will be the biggest convention held in the Northwest this year—perhaps for many years.

About every fourth man that comes to the convention will bring his wife. Wives have ways of convincing their husbands that no man's convention is complete without a touch of the feminine, particularly when the meeting has to do with so domestic a purpose as gas. So there will be 500 women here, hardly two of them from the same city or town. Some will come from Portland, Me., and some from Portland, Ore.; some from Mobile or Galveston, and some from Buffalo or Spokane. This is the biggest gas association in the world, and most of it will be in Minneapolis the first week in December.

The women who talked over plans yesterday were wives of officials of the St. Paul Gas Light Company, chaperoned by George Steinwedell of that company. The meeting was held in the tea-room of the Minneapolis Gas Light Company, following luncheon served by the company. The St. Paul women will entertain the women visitors one day.

Perhaps in all the convention history of the armory it was never so brilliant as it will be for this meeting. So numerous have been requests for space by manufacturers of fixture and apparatus pertaining to gas production that 165 booths have been provided; 60 more than were necessary when the convention was held in Philadelphia,

and 35 more booths than were in Madison Square when the gas men met there, and that convention was long regarded as the high water mark.

So the armory will be a blaze of light—gas light, if you please. Electric lights may be well enough in their way, but their way is not this particular way of light. It is promised that there will be some wonderful effects, spectacular and otherwise. One Pittsburg firm will have a miniature gas works, all of glass, so consumers can see there is nothing underhanded in gas making. There will be a family refrigerating plant, which will be worked by simply turning on a gas jet where the ice man generally leaves his slight contribution, and the maker of this apparatus will endeavor to prove that the gas meter is a far better friend of the family pocketbook than the ice man's scales.

There will be every sort of gas fixture for light, heat and cooking. Appliances will be shown doing everything possible with gas. Women who are not above doing a little light housekeeping unbeknown to the landlady may see the latest wrinkles in gas plates. It will be the great endeavor to educate the public in using gas, and still more gas, for more household and commercial purposes than ever before, and all in the interest of economy.

A. T. Rand, president of the Minneapolis Gas Light Company, is chairman of the local entertainment committee, and W. H. Levings, secretary, is co-chairman. The St. Paul women will only have the women visitors for one day, as planned now, and Minneapolis will have them the rest of the time. Minneapolis weather the first week in December is not always reliable, and outdoor pleasures cannot be enjoyed as in summer. But a great majority of the women visitors will be from small cities and towns, and any entertainment worthy of Minneapolis will be a treat to them. As for the men, they will be busy at the armory—anyhow, men can look after themselves.

In a sense, this exhibit will be a style show. There is a business reason for holding the convention in December rather than earlier. Manufacturers do not get out their new lines of goods until late in the year, and they will show in Minneapolis what will be on sale next year. They guard well their new styles. The goods and appliances that will be on display when the doors swing open Nov. 30, will be surprises to everybody but the men showing them. Minneapolis for that week will be the Paris of the gas fixture world.

New Methods and Appliances.

THE ALTIOR PROCESS OF DIE CASTING.—The National Alloys, Limited, London, have recently brought out an improved process of die-casting for aluminum alloys of a specific gravity of 2.85. The alloy recommended is ivanium, which has a tensile strength of 12 tons, and 6 per cent. elongation on 2 inches. This alloy is guaranteed not to disintegrate, and it is not affected by sea water, etc. The casting machine has a gas-heated melting pot lined with refractory material and provided with a cover. Extending from the cover to within a short distance of the bottom of the pot is a tube of refractory material connecting with a neck-piece fixed above the cover and surrounded by a burner. Above this neck-piece is a plate, to which the bottom half of the die is fastened. The plate, which is hinged and can be thrown back by a worm and spur gear, also carries the standards and cross-frame for a large vertical quick-pitch screw, to which the upper part of the die is fastened. Between the lower die plate and the neck is a slot, in which works a sprue-cutting bar. The action is as follows: After fixing the dies the sprue-cutting bar of hardened steel is pushed over, so that communication between the inside of the pot and the die is prevented. An inert gas is then admitted to the pot above the metal, and a high pressure maintained inside the pot. When the metal is melted and the sprue-cutter pulled over so as to bring a hole in it fair with the hole communicating with the die, metal is forced out of the pot up the tube into the die. The cutter bar is then pushed over, cutting off the connection, and the upper half of the die raised by the quick-pitch screw. The casting is removed automatically, and the die returned to its original position. The piece of alloy is punched out of the cutter-bar, and on pulling the bar over again a fresh supply of metal is forced into the die. It is claimed for the machine that the metal is kept hot right up to the time of entering the die, while the dies themselves, being mounted on the pot, are also always at a suitable temperature. The whole cover with the die-frame may be swung back, if necessary. The pot is provided with plungers for mixing the metal and with a filling-hole, and it is surrounded with a casing of refractory material.

Items of Interest
FROM VARIOUS LOCALITIES.

REFERENCE has been made to the early extinguishing of the street lights and lights in cafes, restaurants and entertainment houses in Paris. The Paris correspondent of the "Daily Telegraph" says: "Since the advent of M. Millerand as Minister of War, many regulations have been changed, and while some increase our liberties, others are of some inconvenience, but wisely taken, nevertheless. One of these is the putting out of the lights in the principal squares and avenues at 8 or 9 o'clock at night. The measure on the first two nights created some embarassment to people out late. Paris, with all its avenues and bridges over the Seine plunged in obscurity, was frightened like a child in the dark. But like a child it went to sleep and forgot its fright. Now that the enemy's flying machines come scouting over the city, there is no reason why its principal squares, public buildings and avenues should be shown them by brilliant illumination. Besides, should it ever come to a siege, it is an idle waste of gas and coal to keep such profuse lighting going as is the custom in time of peace. The coal had better be hoarded up and kept for the bad days if they should ever come." A different condition of things exists in Brussels. Since the German occupation of the city, a proclamation orders that the inhabitants must keep their houses lighted all night. Whether inhabitants and suppliers of gas and electricity will be pleased, we cannot say. The consumption of gas and electricity by public houses in London is to be reduced; for in the general interests these houses are to be closed at 11 o'clock.

"T," WRITING from Fort Worth, Tex., says: "Picking money out of the air will be a regular Fort Worth occupation if the expectations of S. L. Wagley, regarding a new process of gas manufacture, proves as great a success as he outlines. Wagley (we fear he is) says he has been experimenting for 16 years on this process. He claims he can produce gas for lighting at 1 cent per 1,000 cubic feet and have as by-products nitrates of lime, soda and ammonia. He has figured that $3.20 will produce 320,000 cubic feet of gas and a ton of by-products. He estimates the total possible return on the $3 20 at $216. If there is more gas than the demand he has a process to convert it into gasoline. He has applied for patents on his various machines and offers free use of his processes to the United States government for vessels and public institutions, and to the State for their institutions. He claims that his process of extracting nitrates from the air is much simpler than the German process and that with a $10,000 plant he can produce gas enough for heating and lighting Fort Worth and all towns in a radius of 20 miles. According to his announcement a $10,000,000 company will commercialize his inventions."

FROM the *News*, of Hamilton, O.: Hamilton's three municipal plants lost $3,526.77 during the month of September, according to reports of city Auditor E. E. Erb. Many extensions were made during the month accounting for part of the loss, while the lower rates in the electric department also caused this plant to lose money.

The reports follow:

Total expenditures, gas plant	$9,128.38
Total receipts, gas plant	7,177.57
Loss	$2,010 57
Total expenditures, electric plant	$4,405.89
Total receipts	4,056.62
Loss	$349.27
Total expenditures, water plant	3,169.87
Total receipts, water plant	2,002.94
Loss	$1,166 93

THE controversy between the town of Dover, N. J., and the Dover, Rockaway and Port Oram Gas Company will probably reach an amicable settlement, according to the report made to the Board of Public Utility Commissioners by Elmer King, counsel for the town of Dover. He reported that the town council had passed a resolution establishing a minimum rate of $1 a month.

THE Water and Light Department of Duluth, Mich., has put into effect a regulation whereby large consumers of gas get a reduced rate, paying 75 cents per 1,000 cubic feet for the first 50,000 and 50

cents for all used in excess of that quantity. Few customers, however, get the benefit of the low rate, as the number who use that much is limited. Manager D. A. Reed says that if a modification of the contract with the Zenith Furnace Company, from whom the City Department purchases oven gas, can be secured, a sliding scale may be put into effect. The contract still has six years to run. Under it the city pays the company 40 cents per 1,000 cebic feet for gas used for domestic purposes and 37½ cents for gas used for manufacturing. Payments are made on meter readings of the city.

PUBLIC service corporations in California need not pay the State license tax on motor vehicles used in the activities of the corporations. The Supreme Court of California so declared, holding that the constitutional amendment, referring to the taxation of public service corporations distinctively provides that such corporations shall not be compelled to pay any tax or license fees other than those specifically prescribed by the amendment. The ruling was made in the case of the Pacific Gas and Electric Company against the State.

MR. R. H. STERLING has been appointed Manager of the Santa Barbara (Cal.) Gas and Electric Company. Mr. Sterling was for years Manager of the American River Electric Company in Stockton. The Santa Barbara "News" recently contained the following concerning Mr. Sterling: "While with the Pacific Gas and Electric Corporation he did two things which gave him an almost National reputation. He constructed what was then the longest high-tension transmission line in the world, from the Sierra Nevada range hydro electric generating stations, to Oakland, a distance of 210 miles. This line is one of the main sources of Oakland's electricity supply to-day. The second big work he performed was the construction of an aero cable crossing over Carquines Straits, at the head of San Francisco bay. This high-tension line had to carry 60,000 volts across a mile of water, in one span, above the masts of the largest ships."

THE hard times are reflected in the prevalence of meter robbers. Officials of the Fall River (Mass.) Gas Company reported to the police that during one week there have been no less than 40 gas meters broken into and money taken. This is considered a record for this kind of thieving. The police have been made acquainted with complaints of this kind for a long time past but it has not been until recently that the thefts have been committed on such a large scale. Now and then the police find out that boys are responsible for the breaks, but 40 for a week has convinced the authorities that others than boys are at work.

A PENNSYLVANIA charter has been granted to the Lykens Valley Consolidated Gas Company to manufacture and supply gas in the boroughs of Lykens and Williamstown, and the townships of Wiconisco and Williams. The office will be at Lykens. The incorporators are N. B. Reeser, of Newville, and Jonas M. Rudy and G. C. Gochnauer, of Harrisburg. The same three are also directors, with G. C. Gochnauer as treasurer.

AT the recent meeting of the Consolidated Gas, Electric Light and Power Company, in Baltimore, the directors and officers were re-elected. They are as follows: J. E Aldred, President; Herbert A. Wagner and Charles M. Cohn, Vice-Presidents; John L. Bailey, Treasurer, and Wm. Schmidt, Jr., Secretary. Executive Committee, J. E. Aldred (chairman), John L. Bailey, Charles T. Crane, Nicholas F. Brady, Norman James, Charles M. Cohn, Herbert A. Wagner, S Davies Warfield and Frederick W. Wood.

THE "Telegram" says: The suggestion comes from the N. Y. City Commissioner of Water, Gas and Electricity, on the plea of economy, that the police turn on and off the street lamps. Under the present system it costs $40,000 a year for the process. It is the opinion of many that posts would be better covered if the men assigned to them had definite duties to perform instead of waiting until some one committed a burglary or murder under their noses. The police have been relieved of almost everything in the interest of special squads, headquarters details and other payroll padding devices. Unless it is deemed something "unbecoming an officer" or conflicts with the labor interest, or the Ancient Order of Lamplighters is too powerful politically, there seems to be no good reason why the police shouldn't shed light in dark places at night and shut it off again at sun-up.

THE Cuero (Tex.) Commercial Club is preparing the final maps and information necessary for completing the inspections made by representatives of a company which plans erecting a gas plant. The men looking into the matter are not promoters but represent a company that erects and maintains gas plants for revenue and the improvement of the community entered. The Cuero plant will cost approximately $90,000, including 12 miles of mains. Reports sent into headquarters by the inspectors are favorable and the Commercial Club believes Cuero will get the plant.

"F. M. S," WRITING from New Bedford, Mass., says: "Magnificent in general construction, gorgeous in its interior finish, beautiful from an architectural viewpoint, complete in every detail; and, without doubt, one of the most scientifically appointed and extensive structures in this section of the county, devoted exclusively to the administration end of a public service enterprise, is the new building of the New Bedford Gas and Edison Light Company at Purchase and Spring streets, thrown open Tuesday for the first time for public inspection. The building is in every sense the 'last word' in modern construction, arrangement, equipment and detail, and is a splendid addition to the beautiful business centre in process of development in the heart of the city. All the office business of the company is now transacted in the new quarters. There were a large number of visitors to the building Tuesday afternoon, and heads of various departments were engaged escorting parties through the structure and explaining the various equipment and appointments of the scores of offices, show rooms, testing rooms, laboratories, workshops and other apartments, including a splendidly appointed resting room for the women employees on the second floor, a large handsomely furnished club room for the male employees on the third floor and an auditorium and meeting hall. The provisions made for the convenience of the employees and the promotion of the social side of their business lives bespeaks an unusually strong harmonious relation between the employer and the employed in this business.

ALTHOUGH it is not expected that President W. W. Scranton, of the Scranton (Pa.) Gas and Water Company, will ever be as active again in the management of the affairs of the compsny as he was before being recently stricken with a severe illness, he is taking a very active part in the big improvement being made by the company at the No. 7 dam in Dunmore. Every day Mr. Scranton is out in his automobile, going to No. 7 dam frequently and doing some superintending of the work that is being done there to make the plant better than ever.

A CORRESPONDENT says that the new gas plant of the Muscatine (Ia.) Lighting Company will be in active operation within 2 weeks. The building has already been completed in its entirety, but the installation of the new machinery will occupy at least 10 days. Upon its installation the new method of manufacturing gas will be permitted, a process which is expected to add much to the improvement of local conditions. The completion of the addition to the gas plant are among the most notable undertaken by the local public utilities corporation during the past 5 years.

A SPECIAL meeting of the directors of the Reading (Pa.) Gas Company was held at the office of the Consumers Gas Company for the purpose of electing a president to fill the vacancy caused by the recent death of William R. McIlvain. William McIlvain, a son of the deceased president, was chosen to succeed his father. He is a well-known dealer in securities and is identified with a number of local enterprises. W. Harry Orr was elected as director. Mr. McIlvain's family has been long identified with the Reading Gas Company. His grandfather. the late Edmund D. Smith, was a prominent officer and large stockholder for many years.

THE Tampa, Fla., "Tribune" of Oct. 5th, says: "On an annual tour of inspection of the plant of the Tampa Gas Company, and to learn the general business conditions in this city, John Gribbell, President of the company, accompanied by Vice-President D. J. Collins and Engineer J. D. Shattuck, of Philadelphia, arrived in the city last night and will spend some days here. Mr. Gribbell is a consistent booster as well as being a thoroughly sound business man and has shown his friendship for Tampa and his interest in civic improvement on more than one occasion. The Tampa Gas Company, Mr. Gribbell's Tampa concern, has developed into an exceptionally progressive institution, and Mr. Gribbell's present visit to the city is thought to augur additional improvements to the plant and the service accorded the public. While here Mr. Gribbell and Mr. Collins will visit the fine groves and vegetable lands which they own at Elfers.

Utilities Commission News.

MARYLAND COMMISSION'S QUESTIONS.—In investigating complaints against the Baltimore Consolidated Gas, Electric Light and Power Company, and as relating to proposed Maryland standards, the Public Service Commission has submitted these questions to Vice-President Cohn;

What is the net holder cost of gas of the quality which you are now making expressed in cents per thousand cubic feet?

What is the heating value of this gas?

What would be the net holder cost of gas made by the same or similar processes if the heating value were 675 B. T. U.'s units per 1,000 cubic feet, assuming that no gas were received from Sparrows Point?

What amount of gas and what quality of gas would you expect to receive if the Sparrows Point plant were in full operation?

How would receipt of this amount and this quality of gas from Sparrows Point affect the net holder cost of producing gas of the quality which you state you are now producing, assuming that the remainder of the gas was manufactured by about the same process you are now using?

What other factors which enter into the total cost of rendering gas service would be affected by changing the quality of gas from 675 B. T. U.'s to the quality which you are now producing? Please express these changes in dollars a year, approximately.

How would the sales of the company probably be affected by changing the quality of gas from that which you are now producing to 675 B. T. U.'s average heating value?

On the basis of your statements as to net holder cost and changes in other items of cost, and changes of sales, will you now indicate how the total cost of producing, distributing and selling gas, including fixed charges, general expenses, etc., as your company is accustomed to estimate them, would be changed by changing from the present quality to 675 B. T. U.? Please express these estimates in cents per 1,000 cubic feet for each quality.

Please answer the same question for changes from the present quality of gas to an average heating value such as would be maintained if a standard of 600 B. T. U. were required and no candle power requirements were in force?

Please also answer the same question and give estimates on the assumption that a standard of 570 B. T. U. were established and no candle power requirements were prescribed?

What candle power in the open flame would the gas have if of the following heating values; (a) Assuming the gas to be made by approximately your present water gas process, and (b) assuming the gas to be a mixture of Sparrows Point gas in the quantity and of the quality which you above state would be received under normal operation of the Sparrows Point works, mixed with sufficient gas made by your present process to produce the total quant ty required? These answers to be for 570 B. T. U., 600 B. T. U., your present quality, and 675 B. T. U.

ILLINOIS CALORIFIC STANDARD.—There seems to be a misapprehension with respect to the meaning of the recent action by the Public Utilities Commission of Illinois bearing upon the quality of gas to be furnished to consumers in that State. The Commission has issued "rules establishing standards of service for gas and electric utilities," which are to become effective November 1. With reference to gas it is stipulated that the monthly average of the total heating value shall not be less than 565 B. T. U.'s to each cubic foot; and at no time less than 530 at the point of consumption. This is considerably lower than the standard now maintained in Chicago. The new rules of the Commission merely set standards toward which that body will work, and in no case where gas is now supplied of a higher standard than specified in the rules will there be a lowering of the standard without the written consent of the Commission. The members of the Commission believe that the public would benefit from the ultimate reduction in candle power and heating value of gas furnished in certain cities. Reduction in heating value would permit the utilization of Illinois coal in the manufacture of gas instead of oil and high priced eastern coal. In no case will a lowering of standard be permitted without a hearing upon the merits of the specific petition; and the price to consumers will be lowered if conditions warrant a reduction of standards. If a community can show that its interests are better served by the higher standards the general rule will not be made effective there.

LONG ISLAND EXTENSIONS.—The up State (New York) Public Service Commission has approved a considerable extension of the lines of the Patchogue Gas Company in the town of Brookhaven, Suffolk County, after a hearing in New York city, at which no opposition was heard to the exercise by the company of franchises received from the town board and superintendent of highways. The territory through which the company is permitted to extend its gas mains and appurtenances is that part of the town of Brookhaven lying north of the main line of the Long Island Railroad, and that part of the town outside the incorporated village of Bellport between Bellport and the town of Southampton, and between the Long Island Railroad and the Great South Bay.

Financial Notes.

ARRANGEMENTS are already under way for the rehabilitation of the Atlantic Gas and Electric Company. As was stated at the time the petition in bankruptcy was filed, the action is a friendly one and a step preliminery to the introduction of new financial interests to take up uncompleted construction work. This work the company found impossible to finish, even though its completion was vital and necessary as the earnings which would accrue therefrom would place the company on a stable basis. According to well informed sources, the various creditors have been taken into consultation and the reorganization of the company is looked for in the near future. This will probably mean no change in corporate identity but will result in new management for the company.

THE regular quarterly dividend (46th quarter) of 1¼ per cent. has been declared on the preferred stock of J. G. White & Company, Incorporated, payable November 1, 1914, to stockholders of record October 22, 1914.

PREFERRED stockholders of the Ohio Cities Gas Company have received checks covering the regular dividend of 1¼ per cent. With the checks, announcement was conveyed to the shareholders that the permanent stock certificates of the new company are available and those holding temporary interim certificates may forward them to the company's office and exchange them for permanent ones.

THE annual report of the New York, New Haven and Hartford R. R. Company shows among its security holdings $209,350 of the stock of the Waterbury Gas Light Company.

A CHICAGO paper, in answer to an inquiry, says the shares of the Peoples Gas Light and Coke Company are considered an investment stock. It is understood that the 8 per cent. dividend is being earned at the present time. However, the rates the company may charge for gas are subject to regulation by the public service commission and a reduction of rates or a slight decrease in the earnings from some other cause might reduce the dividend.

THE East Boston Gas Company, in addition to filing a petition with the Massachusetts Gas Commission for authority to consolidate with the Boston Consolidated, has requested the authority of the board to the issue of 17,972 additional shares of stock at par $25, for the purpose of providing $449,300 to pay indebtedness already incurred for new construction, additions, extensions and permanent improvements and to acquire such additional plant and property and to make such improvements as the directors shall from time to time vote. By the issue of additional shares asked for the capital will be increased from $575,000 to $1,024,300. It is on the increased capitalization of $1,024,300 that it is proposed to consolidate the East Boston Gas Company with the Boston Consolidated Company, on the basis of one share of Boston Company stock par $100 for four shares of East Boston stock par $25, which is virtually a share-for-share basis on a $100 par value, requiring the issue of 10,243 new shares by the Boston Consolidated Gas Company,

AT the annual meeting of the stockholders of the Consolidated Gas, Electric Light and Power Company, Baltimore, Md., the report of President J. E. Aldred, referring to the decrease in the company's earnings for the year, says: "The decrease in the gross income of the gas division, notwithstanding the extraordinary increase in the quantity of gas sold, was due to the reduction in the rates for gas. In every branch of the business vigorous efforts were made to extend and encourage the use of gas, and especial attention was paid to the utilization of gas for industrial purposes, resulting in an increase of 33 per cent. in this use over the previous year."

Passing to the financial position, the report has the following:

"The issue of $60,000,000 of debenture stock authorized in 1913 will provide financial requiremer ts for many years to come and also allow the refunding of all outstanding issues of bonds, thus simplifying the financial structure of your company. The successful marketing of this security demands the retirement of the preferred stock by exchange into common stock.

"The directors, at a meeting on August 12, 1914, decided that it was an opportune time to bring about this exchange and to facilitate it declared a dividend of 1¾ per cent. on the common shares, placing them on a basis of 7 per cent. per annum, and at the same time offered the holders of the preferred shares an opportunity of exchanging their stock share for share and thus taking advantage of the increased dividend and putting all shares on the same basis of participation in the company's growth."